Sampling and Analysis Plan
Site Assessment
at Kuhio Park Terrace
Honolulu, Hawaii

Prepared for:

State of Hawaii Department of Health
Hazard Evaluation and Emergency Response Office
919 Ala Moana Boulevard, Room 206
Honolulu, Hawaii 96814

Prepared by:

AMEC Earth and Environmental, Inc.
3375 Koapaka Street, Suite F251
Honolulu, Hawaii 96819

ASO Log No. 02-131

September 2004

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Date

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Date

For USEPA use:

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Expedited Review? ☐ Yes ☐ No

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Reviewed by: Date:

Approved: Date:

Region IX Quality Assurance Manager

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LIST OF ACRONYMS

AMEC	AMEC Earth and Environmental, Inc.
ARARS	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
COC	Chain-of-custody
COPC	Chemicals of Potential Concern
DBEDT	Department of Business Economic Development and Tourism
DDT	Dichlorodiphenyltrichloroethane
DHL	Worldwide Express
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSE	Disposable Sampling Equipment
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
FPHA	Federal Public Housing Authority
GPS	Global Positioning System
HCDCH	Housing and Community Development Corporation of Hawaii
HDOH	Hawaii Department of Health
HHA	Hawaii Housing Authority
HPLC	High performance liquid chromatography
IDW	Investigation-Derived Waste
KPT	Kuhio Park Terrace
LCS	Laboratory Control Sample
LDL	Laboratory Detection Limit
MDL	Method Detection Limits
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mg/kg	milligrams / kilogram
mg/L	milligrams / Liter
MSL	Mean Sea Level
NCP	National Contingency Plan
OERR	Office of Emergency and Remedial Response

PPE	Personal Protective Equipment
ppm	parts per million
PRG	Preliminary Remediation Goals
QA	Quality Assurance
QC	Quality Control
QL	Quantitation Limit
RPD	Relative Percent Difference
RSCC	Regional Sample Control Coordinator
SAP	Sampling Analysis Plan
SD	Standard Deviation
SIM	Selective Ion Monitoring
SOP	Standard Operating Procedure
TMK	Tax Map Key
ug/kg	microgram / kilogram
Ug/L	microgram / Liter
UIC	Underground Injection Control Line
USDA	United States Department of Agriculture
USEPA	US Environmental Protection Agency

SECTION 1
INTRODUCTION

This document is the Sampling Analysis Plan (SAP) for a Site Assessment at the Kuhio Park Terrace Brownfields (hereafter referred to as the "Site"), located in Kalihi, on the Island of Oahu, Hawaii. This document was prepared by AMEC Earth and Environmental (AMEC) under a non-emergency response contract (ASO Log No. 02-131), to support the State of Hawaii Department of Health (HDOH) in planning and performing a Site investigation to assess potential soil impacts from contamination. The long-term goal for the Site is redevelopment for residential and community use.

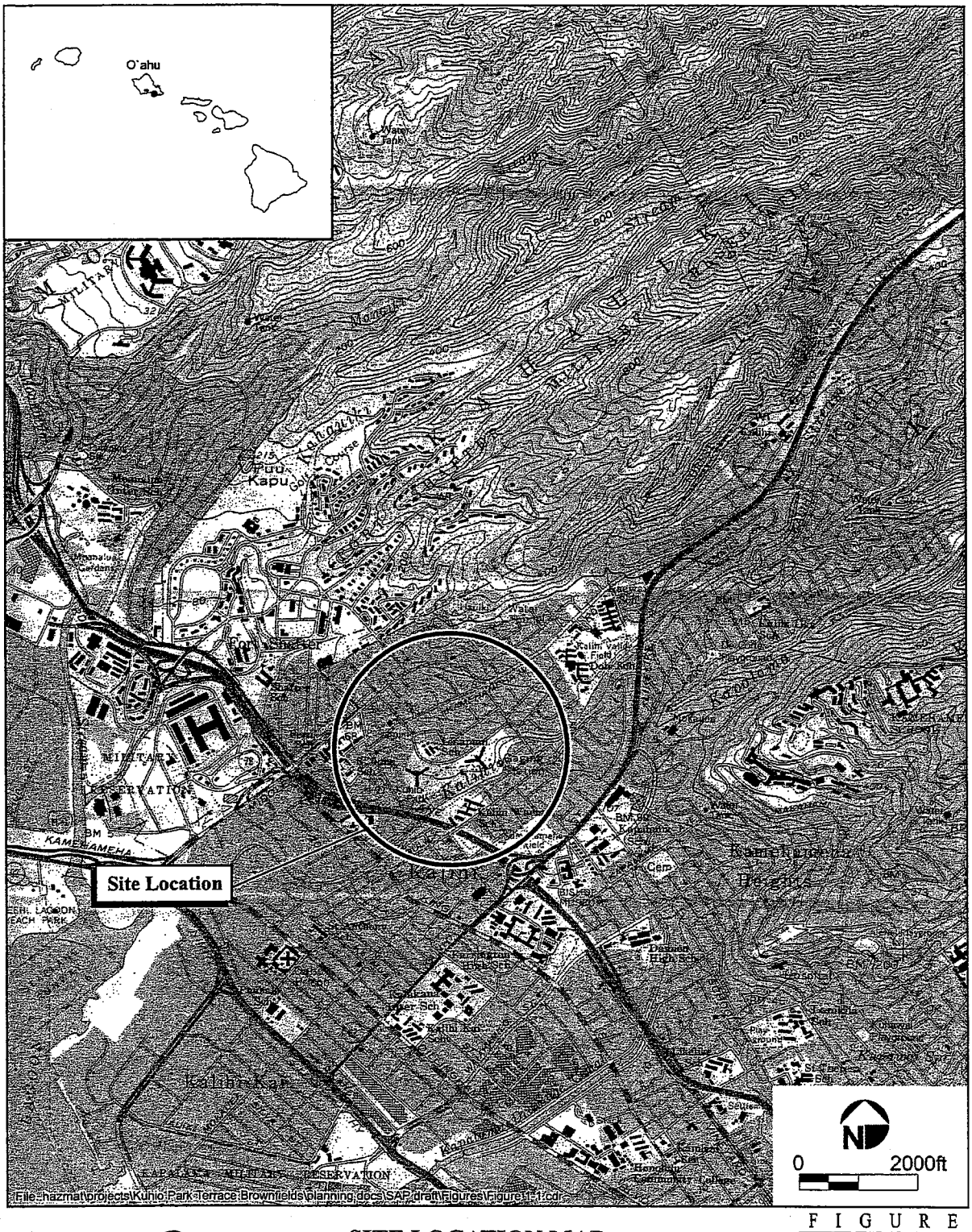
This SAP describes the specific field sampling activities, chemical analyses, and quality assurance procedures that will be conducted to support the Site Assessment Study and has been prepared in accordance with parameters and elements defined in the Scope of Work. Elements of this SAP were based on the following guidance documents:

- *Quality Assurance Guidance for Conducting Brownfields Site Assessments* (USEPA 1998);
- *Guidance for the Data Quality Objectives Process (QA/G-4)* (USEPA 1994); and
- *Sampling and Analysis Plan Guidance and Template, Version 1, USEPA Analytical Services Used* (R9QA/0001, March 2000).

1.1 SITE NAME OR SAMPLING AREA

The Kuhio Park Terrace (KPT) Brownfields Site is commonly referred to as KPT. The Site is located on the south side of the island of Oahu, in Kalihi, Hawaii (Figure 1-1). The KPT Brownfields Site consists of an irregularly shaped parcel of land (Tax Map Key (TMK) 1-3-39:001). The Kuhio Park Terrace development includes two 16-story reinforced concrete towers, 12 low-rise townhouses and 2 single-family homes.

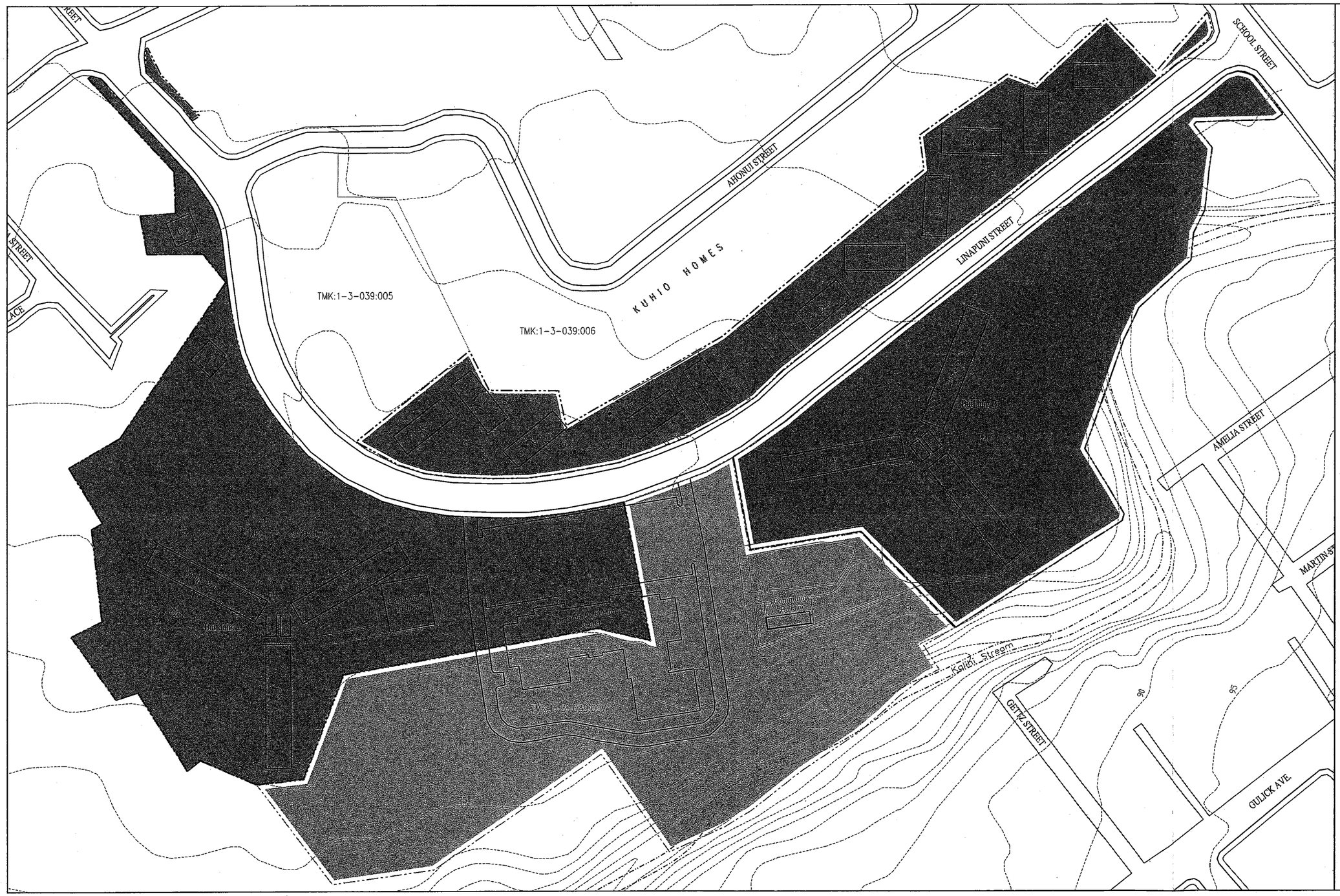
The Site is bound by School Street to the northeast, Kalihi Stream to the southeast, and the Kuhio Homes development to the west (Figure 1-2). The Site is located in a heavily developed residential area.



FIGURE

SITE LOCATION MAP
Kuhio Park Terrace Site
Honolulu, Hawaii

1-1



LEGEND

- Project Area Parcel Boundaries (15.273 acres) TMK:1-3-039:001
- Adjacent Parcel Boundary TMK: 1-3-039:007
- Stream
- 5 ft. Contour

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. Area of site calculated from Taxation Map Bureau, Territory of Hawaii Tax Map Zone 1 Sec 3 Plate 39 Drawing No. 2622, Dated 1946.
3. File:.NPG\AE\KPT\KPT_SP.DWG Date: 12/16/03

SOURCES

C&C Honolulu Tax Map Database, 2003

C&C Honolulu GIS Data, 5-ft. Contour Update Oct. 22, 2001.

Hawaii and Community Development Corporation of Hawaii (HCDCH), Construction Management Map (detail), 1998

Aerial Photography 1971 and 1997, Air survey Hawaii

N

70 0 140

Feet

amec

Site Layout
Kuhio Park Terrace
Kalihi, Oahu

FIGURE

1-2

1.2 RESPONSIBLE AGENCY

The HDOH has been contracted by the Department of Business, Economic Development, and Tourism (DBEDT) to oversee implementation of the Brownfields environmental program. HDOH has contracted AMEC under a non-emergency response contract (ASO Log No. 02-131), to plan and perform a Site investigation to assess potential soil impacts from contamination. The environmental investigation shall consist of a combined comprehensive preliminary site assessment and a site investigation with limited soil sampling. AMEC is an environmental consulting company that has provided professional services to clients in Hawaii for over fifteen years. AMEC's technical staff includes geologists, engineers, toxicologists, and biologists.

1.3 PROJECT ORGANIZATION

Organization/Responsibility	Name	Phone Number
USEPA Project Officer	**Thom Mix**	**415-972-3248**
DBEDT Project Manager	**Gail Suzuki-Jones**	**808-587-3802**
HDOH Project Manager	**Melody Calisay**	**808-586-7576**
AMEC Project Manager	**Liza Liew**	**808-545-2462**
EPA Quality Assurance Manager	**Vance Fong**	**415-972-3798**

1.4 STATEMENT OF THE SPECIFIC PROBLEM

According to the HDOH Brownfields website, the Housing and Community Development Corporation of Hawaii (HCDCH) has prepared a master plan outlining future redevelopment plans for KPT. The redevelopment includes demolishing all of the current structures onsite and building several new low and mid-rise apartments and single-family dwellings. Additional proposed land uses include elderly housing, community services, playgrounds, and basketball courts.

Soil sampling conducted in February 1997 around Building D-1 and D-2 reported levels of dieldrin above the United States Environmental Protection Agency (USEPA) Region IX Preliminary Remediation Goal (PRG) for residential soil. The elevated concentrations of dieldrin may pose a potential human health risk. As a result, the site requires additional characterization to assess the impact of detected concentrations of pesticides (and associated compounds) under the current and future land use scenarios.

SECTION 2
SITE BACKGROUND

This section presents background information on the Site including descriptions of Site history, physical setting, and land use. Possible sources and nature of contamination are summarized based on previous investigations.

2.1 SITE DESCRIPTION

The KPT Brownfields Site consists of an irregularly shaped parcel of land in Kalihi, Hawaii (TMK 1-3-39:01). Linapuni Street, the only onsite road, bisects the KPT property. The Kuhio Park Terrace complex is in the middle of the largest concentration of public housing in the State with Kalihi Valley Homes to the north, Hauiki and Kuhio Homes to the west, Pauhala Homes I through IV to the east, and Kamehameha and Kaahumanu Homes to the south (HCDCH 1999).

The Kuhio Park Terrace development includes two 16-story reinforced concrete towers with three wings radiating from a central service core. The two high-rises are referred to as Buildings A and B. Building A contains 274 units and Building B contains 298 units. In addition to the two high-rises, the Site also contains eight four-plexes (C-1 through C-8), four duplexes (D-1 through D-4), 2 single-family homes (E-1 and E-2), and a Community Resource Center.

The Site is relatively flat, but slopes gently toward Kalihi Stream with surface water drainage flowing in a southeasterly direction. There are several storm drains on the property as well. Elevations over the Site range from about +90 feet above mean sea level (MSL) in the northwestern corner to approximately +70 feet near the southeastern corner.

2.2 SITE OPERATIONS

All research indicates that the site has been used for public housing since the mid-1940's. Before major development of the area in the early 1900's, the land was used for taro cultivation on many small individually owned parcels of land. "Extensive terraces covered all the flatland in lower Kalihi Valley for approximately 1.25 miles on both sides

of the (Kalihi) stream (Handy 1940)." The area was terraced and the "wet" taro was irrigated via drainage ditches extending from Kalihi Stream.

A search of historical aerial photographs showed that the property was used for public housing since the late 1940's. Approximately 62 low-rise townhouse buildings were observed in an aerial photograph of the Site dated February 16, 1949 (RM Towill, 1949). Successive photographs show that the Site remained the same through August 1962. In an aerial photograph dated November 20, 1963, the low-rise townhouses were gone and the two 16-story high-rises were under construction. New low-rise townhouses were also depicted in the same photograph, presumably the current Buildings C, D, and E series. The structures onsite today appear the same as in the November 1963 photograph. Only landscaping and smaller, non-residential structures have changed since 1963.

Tax records indicated that the property (TMK 1-3-39:01) was transferred on April 9, 1952 from the Federal Public Housing Authority (FPHA) to the Hawaii Housing Authority (HHA). In 1998, the HHA was restructured and renamed the Housing and Community Development Corporation of Hawaii (HCDCH). The HCDCH is still the current owner of the property.

HCDCH has prepared a Master Plan for revitalization of Kuhio Park Terrace. The major redevelopment includes demolishing all of the current structures onsite and building several new low and mid-rise apartments and single-family dwellings. Additional proposed land uses include elderly housing, community services, playgrounds, and basketball courts.

A site visit on March 20, 2003 by AMEC and HDOH revealed that the area around Buildings D-1 and D-2 has been landscaped by the local community and is now used to grow indigenous flowers and organic herbs. The landscaping around Buildings A and B include grass and shrubs. Each of these buildings had associated parking lots, which are paved, open-air lots with small landscaped medians. No visibly clear soil contamination was found during the site visit.

2.3 PREVIOUS INVESTIGATIONS

Certified Industrial Hygiene & Safety collected soil samples in February 1997 at Buildings D-1 and D-2 (low-rise townhouses) at the request of HCDCH. Laboratory

results were provided by HCDCH, but the specific locations of the soil samples were not identified. The soil samples were analyzed by USEPA Method 8080, a broad screen analytical technique for a number of pesticides. One organochlorine compound, Dieldrin, was detected in six out of eight samples collected. The two non-detect samples were background samples. Dieldrin belongs to the family of compounds in which Dichlorodiphenyltrichloroethane (DDT) and Chlordane are members. Dieldrin is a water insoluble, persistent, non-systemic insecticide.

A review of the 1997 investigation results indicate that detected concentrations of Dieldrin in Site soils ranged from 0.97 to 6.4 mg/kg. The current USEPA Region IX Preliminary Remediation Goal (PRG) for Dieldrin in residential soil is 0.03 milligrams per kilogram (mg/kg). Since the reported concentrations are above the USEPA Region IX PRG for Dieldrin in residential soils, these elevated concentrations may pose a human health concern at the Site. PRGs are generic cleanup goals intended to be utilized as initial screening criteria for individual chemicals. However, it is important to note that these PRGs are subject to change because they may not address site-specific conditions (i.e., site-specific exposure factors and pathways). At the Site, exposure pathways for Dieldrin are via direct exposures to soil.

An Environmental Assessment (EA) was performed by HCDCH for the adjacent parcel of land (TMK 1-3-39:07) in 1999 as a prerequisite for redevelopment of 2 acres of the property into a community service center at the south side of TMK 1-3-039:01. The EA addressed positive and negative impacts that the redevelopment might have on the local environment, including the Kuhio Park Terrace complex. The HCDCH determined that the action would result in a "Finding of No Significant Impact (FONSI)" on the environment. The construction of the community service center is complete.

2.4 GEOLOGICAL INFORMATION

This section provides a description of the geology, surface hydrology, and groundwater hydrogeology at the Site.

2.4.1 Site Geology

Oahu is composed of two major volcanic mountains, the Koolau Range in the east and the Waianae Range in the west. Lava flows from the younger Koolau volcano banked against

the already-eroded slope of the Waianae Volcano. Both ranges are the eroded remnants of large, elongated shield volcanoes that have lost most of the original shield outlines and are now long narrow ridges shaped largely by erosion. The deposition of alluvium, produced during the erosion of the mountains, formed the Honolulu Plain on the southern flank of the Koolau.

Following a long period of volcanic quiescence and erosion of the Koolau and Waianae volcanoes, volcanic activity returned on Oahu with the eruption of numerous vents and craters (Macdonald et. al. 1983). The Honolulu Volcanic Series were discrete, sporadic events, which produced large volumes of ash and cinder that tended to blanket areas around the craters, such as Punchbowl, and vents, such as Sugarloaf and Tantalus.

The Site is located on the seaward side of the Honolulu Plain on the southern flank of the Koolau. Overlying the Koolau basalt, is a thick wedge of coastal marine sediments inter-layered with alluvial material, cinder and ash, and near shore sediments, which is collectively referred to as caprock.

According to the United States Department of Agriculture (USDA) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, the Site is underlain with two types of soil. The soil in the northern half of the Site is classified as Kaena clay and Makiki stony clay loam in the southern half. Both of these soils developed from the material weathering of the Koolau lavas. The Kaena clay is typically very deep and poorly drained soil that is slightly acid to neutral. Permeability is slow; runoff is slow; and the erosion hazard is slight. The Makiki stony clay loam is a well-drained soil. The surface layer typically contains more stones that the subsoil. Depth to basalt or cinders varies from 20 to 60 inches. The soil is neutral to slightly acid. Permeability is moderately rapid; runoff is slow; and the erosion hazard is slight (USDA 1972).

2.4.2 Surface Water Hydrology

The Site is bordered by Kalihi Stream to the south and east. The stream flows from the northeast to the southwest and discharges at approximately 4 cubic feet per second on average. Surface water runoff drains from the property in a southeasterly direction and discharges into Kalihi Stream. There are also several storm water drains on the property.

The Site receives an average annual rainfall of about 50 inches per year, with much of the rain falling in the winter months. According to the Atlas of Hawaii, approximately 36% of the rainfall infiltrates the soil layers to recharge the groundwater for the Island of Oahu. Approximately 24% of rainfall is lost to surface runoff and 40% is lost to evapotranspiration (Atlas of Hawaii 1983).

2.4.3 Groundwater Hydrogeology

The primary component of the hydrogeologic environment within the island of Oahu is a deep basal, fresh groundwater body floating on, displacing, and existing in dynamic equilibrium with salt water saturating the highly permeable basalt of the island base. This basal groundwater body originates primarily as rainwater percolating into the island from higher drainage basins. The tendency of percolated groundwater is to migrate seaward through zones of the highly permeable basalt basal rock until it meets thick sequences of the comparatively impermeable caprock that overlaps the seaward margins of basal rock.

The Site is located above the Honolulu Aquifer, which is separated into upper and lower aquifer types. The upper aquifer, within the caprock sediments, is classified by Mink and Lau as unconfined, basal, and flank. The status is listed as a moderately saline potential groundwater source that is replaceable and has a high vulnerability to contamination. The lower aquifer is considered to be confined, basal, and flank. The status is listed as an irreplaceable, currently used, fresh drinking water source that has a low vulnerability to contamination (Mink and Lau 1990). The type of groundwater most likely to be impacted by Site activities, however, is water contained in the shallow marine sediments, alluvium, and fill that make up the caprock beneath the Site. Although the brackish caprock water is not potable, it may be used for industrial purposes. On the basis of this data, it is assumed that the water in the upper aquifer may be characterized as nonpotable and the water in the lower aquifer may be characterized as potable.

The Site is situated up-gradient of the Hawaii State Underground Injection Control Line (UIC) which typically segregates potable and non-potable aquifers. Typically, the aquifers down-gradient of the UIC line are considered non-potable, and the aquifers up-gradient of the UIC line are considered potential sources of drinking water. A review of the aquifer classification (Mink and Lau 1990) indicates that the UIC line segregation is

intended for the deeper, basal aquifer rather than the shallower caprock aquifer directly below the site.

Public drinking water wells are located hydraulically up-gradient and cross-gradient of the Site. The closest drinking water well is approximately 2,500 feet to the north of the Site and pumps water from the deeper, basal aquifer. Based on nearby observation well measurements, groundwater is approximately 60 feet below ground surface (bgs).

2.5 ENVIRONMENTAL AND/OR HUMAN IMPACT

The HCDCH has prepared a phased Revitalization Master Plan for the Kuhio Park Terrace Brownfields Site. High levels of residual pesticides in soils onsite could potentially impact human health, especially since the Site is targeted for redevelopment as residential lots, community services, and a senior assisted living center. Pesticides have long-reaching impacts on the environment due to their ability to bioaccumulate and biomagnify between trophic levels in food chains. However, due to the developed nature of the Site, it is anticipated that there will be no significant ecological receptors.

SECTION 3
PROJECT DATA QUALITY OBJECTIVES

The data generated during this Site investigation will be used to evaluate the environmental conditions associated with the Site. Specifically, the data will be used to determine if there is a potential risk to human health and the environment from existing impacted soil. The data will support decisions regarding the need for further environmental investigation and/or cleanup, and the adequacy of the Site for educational, residential, recreational, and community purposes. An addendum will be prepared if additional characterization/investigation activities are warranted based on the analytical results obtained during the Site assessment activities specified in this September 2004 SAP. The field sampling design and procedures will be defined for the additional characterization/investigation activities. This addendum will be included in the Site Characterization Study report which will be prepared to document the results of the Site assessment activities.

Data Quality Objectives (DQOs) are qualitative and quantitative statements for establishing criteria for data quality and for developing data collection designs. The DQO process documented in this section was developed in accordance to USEPA's Guidance for the Data Quality Objectives Process (USEPA QA/G-4, Final, September, 1994). This section will accomplish the following:

- Concisely describe the problem to be studied;
- Identify what questions the study will attempt to resolve, and what actions (decisions) may result;
- Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement; and
- Define study boundaries and when and where data should be collected.

3.1 CONCEPTUAL SITE MODEL

Potential soil exposure pathways for human receptors exist at the Site. Based on the intended future use of the Site, human receptors may be exposed to soils potentially

contaminated from past agricultural practices at the Site. Exposure pathways for human receptors include direct contact, ingestion, and inhalation of soil derived dust.

The potential groundwater exposure pathway is expected to be minimal at the site since drinking water wells exist upgradient and tap the lower confined aquifer. Consequently, no characterization of the groundwater will be conducted during this phase of work. The need for future characterization will be based on the results from the soil-sampling program.

3.2 DATA QUALITY OBJECTIVES

The DQO process is a quality management tool developed by USEPA that is used to facilitate the planning of data collection activities. The DQO process provides a systematic procedure for defining criteria in the data collection design. The primary reference for the formal DQO process is the USEPA document *Guidance for the Data Quality Objective Process* (USEPA 1994). The DQO process consists of the following seven key steps:

1. State the problem;
2. Identify the decision;
3. Identify the inputs to the decision;
4. Define the boundaries of the study;
5. Develop a decision rule;
6. Specify tolerable limits on decision errors; and
7. Optimize the design for obtaining data.

DQOs are qualitative and quantitative statements, developed using the DQO process, that are intended to clarify study objectives, define an appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Two types of sampling will be employed to characterize any potential contamination at the Kuhio Park Terrace property. These approaches include systematic grid sampling for the building redevelopment areas to confirm or deny the impacts from past agricultural and site uses, and biased sampling at the foundation of the buildings. The chemicals of potential concern (COPCs) are pesticides, metals, and herbicides. Pesticides are generally applied directly to building foundations and the herbicides are assumed to be evenly distributed throughout the Site due to its historic agricultural uses (discussed in Section 2.2, Site Operations). Additionally, heavy metals such as arsenic and mercury have occasionally been used with pesticides to eradicate ants. Therefore, the highest contaminant concentrations are anticipated to be adjacent to the building foundations. The DQOs for this sampling strategy is shown in Table 3-1 respectively within the framework of the seven-step process.

3.3 Data Quality Indicators (DQIs)

Data quality indicators (DQIs) [accuracy, precision, completeness, representativeness, comparability, and method detection limits] refer to quality control criteria established for various aspects of data gathering, sampling, or analysis activity. In defining DQIs specifically for the project, the level of uncertainty associated with each measurement is determined. Tables 3-2 and 3-3 detail quality control criteria established for this investigation effort.

Accuracy is the degree of agreement of a measurement with a known or true value. To determine accuracy, a laboratory or field value is compared to a known or true concentration. Accuracy is determined by such quality control (QC) indicators as: matrix spikes, surrogate spikes, laboratory control samples (blind spikes) and performance samples. Data for chemistry measurements in the soil samples should meet the accuracy requirements summarized in Table 3-2. Data that do not meet the specified accuracy criteria may be qualified as estimated ("J") or rejected ("R") during data validation activities.

Precision is the degree of mutual agreement between or among independent measurements of a similar property (usually reported as a standard deviation [SD] or relative percent difference [RPD]). This indicator relates to the analysis of duplicate laboratory or field samples. An RPD of <15% for water and <30% for soil, depending

upon the chemical being analyzed, is generally acceptable. Typically, field precision is assessed by co-located samples, field duplicates, or field splits and laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates. Data for chemistry measurements in the soil samples should meet the precision requirements summarized in Table 3-2. Data that do not meet the specified precision criteria may be qualified as estimated ("J") during data validation activities.

Completeness is expressed as percent of valid usable data actually obtained compared to the amount that was expected. Due to a variety of circumstances, sometimes either not all samples scheduled to be collected can be collected or else the data from samples cannot be used (for example, samples lost, bottles broken, instrument failures, laboratory mistakes, etc.). Completeness percent goals typically increase when the fewer the number of samples are collected per event or the more critical the data are for decision making and typically range from 75-95%. A conservative 90% overall completeness goal will be applied to the KPT site data collected. Rejected data are counted against the completeness goal; data that are considered estimated concentrations or undetected are counted as acceptable data. Data should meet completeness goals to fulfill objectives for the project. The data completeness goal is 90 percent for each sample type or matrix. Completeness for metals will be measured on an analyte-specific basis.

Representativeness is the expression of the degree to which data accurately and precisely represent a characteristic of an environmental condition or a population. It relates both to the area of interest and to the method of taking the individual sample. Representativeness is best assured by a comprehensive statistical sampling design, although it is recognized that a valid judgmental sampling rationale can provide an adequate level of confidence for decision making purposes. Representativeness considerations are incorporated into this site-specific plan as described in the sampling rationale (i.e. why certain areas are included or not included) and the quality assurance measures (i.e. the steps being taken to avoid either false positives or false negatives). Representativeness will be assessed qualitatively for each COPC for which chemistry measurements are performed. The following questions will be addressed during assessment of representativeness:

Were samples collected appropriately?
How likely is it that potential "hot spots" for contamination were missed?
Are there any other factors that may have biased results?

Table 3-1

PROJECT DATA QUALITY OBJECTIVE

1. State the problem • Provide an assessment of suspected pesticide and herbicide applications for Buildings A, B, C, and D areas, which will be redeveloped for residential use and would indicate if soil may present a risk to receptors at the site.
2. Identify the decision • Are COPCs present in soils that may pose a risk to site residents?
3. Identify the inputs to the decision • COPCs are measured at evenly distributed sampling locations around the foundations of Buildings A, B, D-1, and D-2 and at the sample grid nodes in the systematic sampling grid. • Chemistry methods are applied for measurements of COPCs in surface soil samples.
4. Define the boundaries of the study • Soil samples will be collected within the defined boundaries of the Site. • Surface soil samples will be collected in the 4 to 6 inch depth range at the locations indicated in Figures 4-1 through 4-3 (systematic grid samples). • Composite soil samples will be collected for systematic grid samples using a five-point configuration (i.e., corners and center of a 25-foot grid square located at each sampling grid node) to maximize sampling area. • Bias surface soil samples will be collected in the 4 to 6 inch depth range around the foundations of Buildings A, B, D-1, and D-2.
5. Develop a decision rule • COPCs are defined as present in a soil sample if they are measured above the detection limits. • COPCs will be compared to current USEPA residential PRGs to assess if the sampled soil may pose a health risk to site residents. If PRGs are exceeded, further environment assessment may be recommended.
6. Specify tolerable limits for decision errors • Measured concentrations for COPCs in a soil sample are assumed to be representative for COPCs at the location of the sample.
7. Optimize the design for obtaining data • Sampling will occur at evenly spaced intervals along the perimeter of the buildings (approximately 1 to 5 feet from building foundations, and within the delineated boundaries of each building area) and at selected sampling grid nodes.

Comparability expresses the confidence with which one data set can be compared to another. The use of methods from USEPA or "Standard Methods" or from some other recognized sources allows the data to be compared facilitating evaluation of trends or changes in a site, a river, groundwater, etc. Comparability also refers to the reporting of data in comparable units so direct comparisons are simplified (e.g., this avoids comparison of mg/L for nitrate reported as nitrogen to mg/L of nitrate reported as nitrate, or ppm vs. mg/L discussions). Comparability will be assessed qualitatively for analytical methods and data in comparable units. Chemistry measurements will be evaluated to verify that the same analytical methods were performed for each COPC. Data for the KPT site will be reported in comparable and customary reporting units (i.e. ug/L for aqueous matrixes, mg/Kg for soils.) USEPA performance based SW-846 methods have been selected to be comparable with previous site data.

Detection Limit(s) [usually expressed as method detection limits (MDLs) or Quantitation Limit(s) (QL)] for all analytes or compounds of interest for all analyses requested must be included in this section. These limits should be related to any decisions that will be made as a result of the data collection effort. A critical element to be addressed is how these limits relate to any regulatory or action levels that may apply.

3.5 Data Review and Validation

Once the samples have been analyzed by a HDOH-approved laboratory, 100% analytical data will undergo a Level III validation by an HDOH-approved vendor using USEPA national functional guidelines for data validation. The Level III data validation process entails evaluating site sample data for compliance with the method acceptance criteria and then determining the data usability and validity. The process consists of checking calculations and records, evaluating QC sample results, and qualifying the data set. Depending on the types of problems identified during the Level III validation and the impact on data quality and decision-making, HDOH may or may not request that full validation (Level IV) be performed on 10% to 100% of the data. Level IV validation entails a more extensive review of bench level laboratory "raw" data reporting including sample preparation logs, chromatographs and instrument logs. The HDOH will contact

Table 3-2
SAMPLING ANALYTICAL ACCURACY AND PRECISION OBJECTIVES
for SOIL at KUHIO PARK TERRACE
HONOLULU, HAWAII

Method	Analyte	Residential PRG	MDL	PQL	Reporting Units	Lower Recovery Limit	Upper Recovery Limit	Relative Percent Difference
SW8081A	Tetrachloro-m-xylene <surr>	na	0	0	mg/Kg	30	125	
SW8081A	alpha-BHC	9.02E-02	0.00047	0.0015	mg/Kg	62	125	30
SW8081A	beta-BHC	3.16E-01	0.0005	0.0015	mg/Kg	62	127	30
SW8081A	gamma-Chlordane	na	0.0005	0.0015	mg/Kg	48	124	30
SW8081A	alpha-Chlordane	na	0.00047	0.0015	mg/Kg	63	121	30
SW8081A	gamma-BHC (Lindane)	4.37E-01	0.00047	0.0015	mg/Kg	59	123	30
SW8081A	delta-BHC	na	0.00047	0.0015	mg/Kg	57	130	30
SW8081A	Heptachlor	1.08E-01	0.00062	0.002	mg/Kg	60	139	30
SW8081A	Aldrin	2.86E-02	0.00047	0.0015	mg/Kg	59	144	30
SW8081A	Heptachlor epoxide	5.34E-02	0.00062	0.002	mg/Kg	66	130	30
SW8081A	Endosulfan I	na	0.0005	0.0015	mg/Kg	54	127	30
SW8081A	**4,4'-DDE**	**1.72E+00**	**0.00062**	**0.002**	**mg/Kg**	**68**	**126**	**30**
SW8081A	**Dieldrin**	**3.04E-02**	**0.00062**	**0.002**	**mg/Kg**	**67**	**125**	**30**
SW8081A	**Endrin**	**1.83E+01**	**0.00062**	**0.002**	**mg/Kg**	**64**	**132**	**30**
SW8081A	Endosulfan II	na	0.00062	0.002	mg/Kg	37	122	30
SW8081A	4,4'-DDD	2.44E+00	0.00062	0.002	mg/Kg	62	136	30
SW8081A	Endrin aldehyde	na	0.00062	0.002	mg/Kg	37	147	30
SW8081A	**4,4'-DDT**	**1.72E+00**	**0.00062**	**0.002**	**mg/Kg**	**54**	**131**	**30**
SW8081A	Endosulfan sulfate	na	0.00062	0.002	mg/Kg	63	130	30
SW8081A	Endrin ketone	na	0.00062	0.002	mg/Kg	56	133	30
SW8081A	Methoxychlor	3.06E+02	0.00062	0.002	mg/Kg	63	129	30
SW8081A	Toxaphene	4.42E-01	0.015	0.05	mg/Kg	31	136	
SW8081A	Decachlorobiphenyl <surr>	na	0	0	mg/Kg	30	126	
SW6020	Aluminum	7.61E+04	0.62	2	mg/Kg	80	120	20
SW6020	Antimony	3.13E+01	0.031	0.1	mg/Kg	80	120	20
SW6020	**Arsenic**	**22 (nc)**	**0.57**	**1.8**	**mg/Kg**	**80**	**120**	**20**
SW6020	Barium	5.37E+03	0.094	0.3	mg/Kg	80	120	20
SW6020	Beryllium	1.54E+02	0.031	0.1	mg/Kg	80	120	20
SW6020	Cadmium	3.70E+01	0.062	0.2	mg/Kg	80	120	20
SW6020	Calcium	na	9.4	30	mg/Kg	80	120	20
SW6020	Chromium	2.11E+02	0.12	0.4	mg/Kg	80	120	20
SW6020	Cobalt	9.03E+02	0.15	0.5	mg/Kg	80	120	20
SW6020	Copper	3.13E+03	0.18	0.6	mg/Kg	80	120	20
SW6020	Iron	2.35E+04	3.1	10	mg/Kg	80	120	20
SW6020	Lead	4.00E+02	0.062	0.2	mg/Kg	80	120	20
SW6020	Magnesium	na	9.4	30	mg/Kg	80	120	20
SW6020	Manganese	1.76E+03	0.062	0.2	mg/Kg	80	120	20
SW7471A	**Mercury**	**2.35E+01**	**0.012**	**0.04**	**mg/Kg**	**80**	**120**	**20**
SW6020	Molybdenum	2.35E+01	0.31	1	mg/Kg	80	120	20
SW6020	Nickel	1.56E+03	0.062	0.2	mg/Kg	80	120	20
SW6020	Potassium	na	31	100	mg/Kg	80	120	20
SW6020	Selenium	3.91E+02	0.15	0.5	mg/Kg	80	120	20
SW6020	Silver	3.91E+02	0.031	0.1	mg/Kg	80	120	20
SW6020	Sodium	na	31	100	mg/Kg	80	120	20
SW6020	Thallium	5.16E+00	0.0062	0.02	mg/Kg	80	120	20
SW6020	Vanadium	5.47E+02	0.94	3	mg/Kg	80	120	20
SW6020	Zinc	2.35E+04	0.31	1	mg/Kg	80	120	20
SW8151A	**2,4,5-T[a]**	**6.10E+02**	**TBD**	**0.05**	**mg/Kg**	**TBD**	**TBD**	**TBD**
SW8151A	**2,4,5-TP (Silvex)[b]**	**4.90E+02**	**TBD**	**0.05**	**mg/Kg**	**TBD**	**TBD**	**TBD**
SW8151A	**2,4-D[c]**	**6.90E+02**	**TBD**	**0.05**	**mg/Kg**	**TBD**	**TBD**	**TBD**
SW8151A	2,4-DB[d]	4.90E+02	TBD	0.05	mg/Kg	TBD	TBD	TBD
SW8151A	Dalapon	1.80E+03	TBD	0.05	mg/Kg	TBD	TBD	TBD
SW8151A	Dicamba (Banvel)	1.80E+03	TBD	0.05	mg/Kg	TBD	TBD	TBD
SW8151A	Dichlorprop	na	TBD	0.05	mg/Kg	TBD	TBD	TBD
SW8151A	Dinoseb	6.10E+01	TBD	0.05	mg/Kg	TBD	TBD	TBD
SW8151A	MCPA[e]	3.10E+01	TBD	0.01	mg/Kg	TBD	TBD	TBD
SW8151A	MCPP (Mecoprop)	6.10E+01	TBD	0.01	mg/Kg	TBD	TBD	TBD

Note: bold text highlights specific contaminants of concern

nc: Non-cancer endpoint. The residential PRG nc endpoint of 22 mg/kg for arsenic was selected as a screening value instead of the lower cancer endpoint value of 0.3896 mg/kg because Hawaii's volcanic soils contain high levels of naturally occurring arsenic

TBD: To be provided. Internal laboratory criteria will be used for data validation and evaluation of these QA/QC criteria.

Table 3-3
SAMPLING ANALYTICAL ACCURACY AND PRECISION OBJECTIVES
for WATER at KUHIO PARK TERRACE
HONOLULU, HAWAII

Method	Analyte	Residential PRG	MDL	PQL	Reporting Units	Lower Recovery Limit	Upper Recovery Limit	Relative Percent Difference
SW8081A	Tetrachloro-m-xylene <surr>	na	0	0	ug/L	33	138	
SW8081A	gamma-Chlordane	na	0.0094	0.03	ug/L	67	120	25
SW8081A	alpha-Chlordane	na	0.0094	0.03	ug/L	67	120	25
SW8081A	alpha-BHC	na	0.0094	0.03	ug/L	36	135	25
SW8081A	beta-BHC	na	0.031	0.1	ug/L	47	136	25
SW8081A	gamma-BHC (Lindane)	na	0.01	0.03	ug/L	38	136	25
SW8081A	delta-BHC	na	0.0094	0.03	ug/L	67	133	25
SW8081A	Heptachlor	na	0.015	0.1	ug/L	40	123	25
SW8081A	Aldrin	na	0.015	0.05	ug/L	38	127	25
SW8081A	Heptachlor epoxide	na	0.0094	0.03	ug/L	62	131	25
SW8081A	Endosulfan I	na	0.0094	0.03	ug/L	50	120	25
SW8081A	**4,4'-DDE**	**na**	**0.0094**	**0.03**	**ug/L**	**52**	**129**	**25**
SW8081A	**Dieldrin**	**na**	**0.0094**	**0.03**	**ug/L**	**62**	**129**	**25**
SW8081A	**Endrin**	**na**	**0.0094**	**0.03**	**ug/L**	**62**	**132**	**25**
SW8081A	Endosulfan II	na	0.0094	0.03	ug/L	35	107	25
SW8081A	4,4'-DDD	na	0.0094	0.03	ug/L	64	132	25
SW8081A	Endrin aldehyde	na	0.015	0.05	ug/L	55	155	25
SW8081A	**4,4'-DDT**	**na**	**0.0094**	**0.03**	**ug/L**	**47**	**138**	**25**
SW8081A	Endosulfan sulfate	na	0.0094	0.03	ug/L	60	132	25
SW8081A	Endrin ketone	na	0.015	0.03	ug/L	46	134	25
SW8081A	Methoxychlor	na	0.0094	0.03	ug/L	60	140	25
SW8081A	Toxaphene	na	0.31	1	ug/L			
SW8081A	Decachlorobiphenyl <surr>	na	0	0	ug/L	39	118	
SW6020	Aluminum	na	31	100	ug/L	80	120	15
SW6020	Antimony	na	0.31	1	ug/L	80	120	15
SW6020	**Arsenic**	**na**	**3.1**	**10**	**ug/L**	**80**	**120**	**15**
SW6020	Barium	na	0.94	3	ug/L	80	120	15
SW6020	Beryllium	na	0.31	1	ug/L	80	120	15
SW6020	Cadmium	na	0.62	2	ug/L	80	120	15
SW6020	Calcium	na	310	1000	ug/L	80	120	15
SW6020	Chromium	na	1.2	4	ug/L	80	120	15
SW6020	Cobalt	na	0.31	1	ug/L	80	120	15
SW6020	Copper	na	1.8	6	ug/L	80	120	15
SW6020	Iron	na	310	1000	ug/L	80	120	15
SW6020	Lead	na	0.31	1	ug/L	80	120	15
SW6020	Magnesium	na	310	1000	ug/L	80	120	15
SW6020	Manganese	na	0.62	2	ug/L	80	120	15
SW7471A	**Mercury**	**na**	**0.000062**	**0.0002**	**ug/L**	**80**	**120**	**15**
SW6020	Molybdenum	na	1.5	5	ug/L	80	120	15
SW6020	Nickel	na	0.62	2	ug/L	80	120	15
SW6020	Phosphorus	na	250	500	ug/L	80	120	15
SW6020	Potassium	na	310	1000	ug/L	80	120	15
SW6020	Selenium	na	3.1	10	ug/L	80	120	15
SW6020	Silver	na	0.62	2	ug/L	80	120	15
SW6020	Sodium	na	310	1000	ug/L	80	120	15
SW6020	Thallium	na	0.31	1	ug/L	80	120	15
SW6020	Vanadium	na	6.2	20	ug/L	80	120	15
SW6020	Zinc	na	7.8	25	ug/L	80	120	15
SW8151A	**2,4,5-T[a]**	**na**	**TBD**	**0.2**	**ug/L**	**TBD**	**TBD**	**TBD**
SW8151A	**2,4,5-TP (Silvex)[b]**	**na**	**TBD**	**0.2**	**ug/L**	**TBD**	**TBD**	**TBD**
SW8151A	**2,4-D[c]**	**na**	**TBD**	**0.4**	**ug/L**	**TBD**	**TBD**	**TBD**
SW8151A	2,4-DB[d]	na	TBD	0.4	ug/L	TBD	TBD	TBD
SW8151A	Dalapon	na	TBD	0.4	ug/L	TBD	TBD	TBD
SW8151A	Dicamba (Banvel)	na	TBD	0.4	ug/L	TBD	TBD	TBD
SW8151A	Dichlorprop	na	TBD	0.4	ug/L	TBD	TBD	TBD
SW8151A	Dinoseb	na	TBD	0.2	ug/L	TBD	TBD	TBD
SW8151A	MCPA[e]	na	TBD	100	ug/L	TBD	TBD	TBD
SW8151A	MCPP (Mecoprop)	na	TBD	100	ug/L	TBD	TBD	TBD

Note: bold text highlights specific contaminants of concern
TBD: To be provided. Internal laboratory criteria will be used for data validation and evaluation of these QA/QC criteria.

the validators to discuss and agree upon which data (if any) requires full Level IV validation.

Data that is unusable or only usable under certain circumstances is assigned a qualifier (e.g., "R" or "J", respectively) by the validators before the validated package is sent to HDOH. Typical validation checks include instrument calibration, blanks, duplicates, matrix spikes and matrix spike duplicates, surrogates, holding times, detection and quantitation limits, and target compound identification. QAO will R- qualify data if significant performance requirements are not met during sample collection and analysis. QAO assigns a J-qualifier to sampling data when uncertainty, in the form of bias, has been introduced into the analysis. The QAO's evaluation will then be provided to the HDOH. The HDOH will determine whether or not the data is acceptable given its intended purpose, comparing the results and comments from validation to the criteria established in Table 3-3 (i.e., to determine whether pesticide contaminants still remain in the surface soils at the site). Unqualified results indicate that adequate QC was maintained during all sampling and analytical activities, and may be used without further inquiry. If any data are R-qualified, HDOH will consult with the data validator to determine data usability. J-qualified data may be used to establish a release of hazardous substances or observed contamination based on the quality of the data and quantity detected.

3.6 DATA MANAGEMENT

Data management will commence during the field investigation. Each soil sample collected will be recorded on a surface soil log that describes the location, soil type, and provides a cross-reference to the sample ID and chain-of-custody (COC) forms. Once data has returned from the laboratory, the electronic deliverables will be checked to ensure the receipt of all requested analytes and again cross checked with the COCs. Data will be tabulated in electronic spreadsheets and again check to ensure proper entry before use in reporting.

3.7 ASSESSMENT OVERSIGHT

The quality assurance (QA) manager will conduct at least one inspection during field operations to ensure that all sample methods and documentation are being praticed. QA

systems will be employed at regular interavals during the data management process as described above. Finally, a peer review process by a senior technical staff will be conducted on the final reporting.

SECTION 4
SAMPLING DESIGN

This section presents the sampling design for this environmental investigation. Sample locations and target COPCs are provided in the following subsections.

4.1 SOIL SAMPLING

Surface soil samples will be collected from the Site to assess surficial contamination. All surface soil samples will be collected at depths of 4 - 6 inches bgs.

4.1.1 Sampling Locations

A sampling program has been prepared for the Building A area, Building B area, and Buildings C and D area based on the planned phased revitalization Master Plan for the Site and the previous analytical results from the previous environmental investigation. Systematic composite samples will be collected to determine whether contamination is present at the Site, specifically in the building areas that were not previously tested for target COPCs. A 100-foot by 100-foot grid square interval configuration will be established in each of the building areas to determine the systematic surface soil sampling locations. Each sampling node will serve as the center for a 25-foot square that delineates the boundaries of a composite sampling grid. Composite soil samples will be collected at the corners and center of the grid at each sampling locations.

In addition, grab soil samples will be collected at biased sampling locations evenly spaced around the foundations of Buildings A and B since pesticides are generally applied directly to building foundations and the herbicides are assumed to be evenly distributed throughout the Site due to its historic agricultural uses. Additionally, heavy metals such as arsenic and mercury have occasionally been used with pesticides to eradicate ants. Therefore, the highest contaminant concentrations are anticipated to be adjacent to the building foundations. Grab samples will also be collected in the vicinity of Buildings D-1 and D-2 to verify the presence of the dieldrin and other COPCs which were previously detected in soil samples collected from this area. Due to the compact and dense nature of the configuration of the buildings in the C and D townhouses, the grid sampling design will accomplish the sampling goals of both the grid and grab sample design.

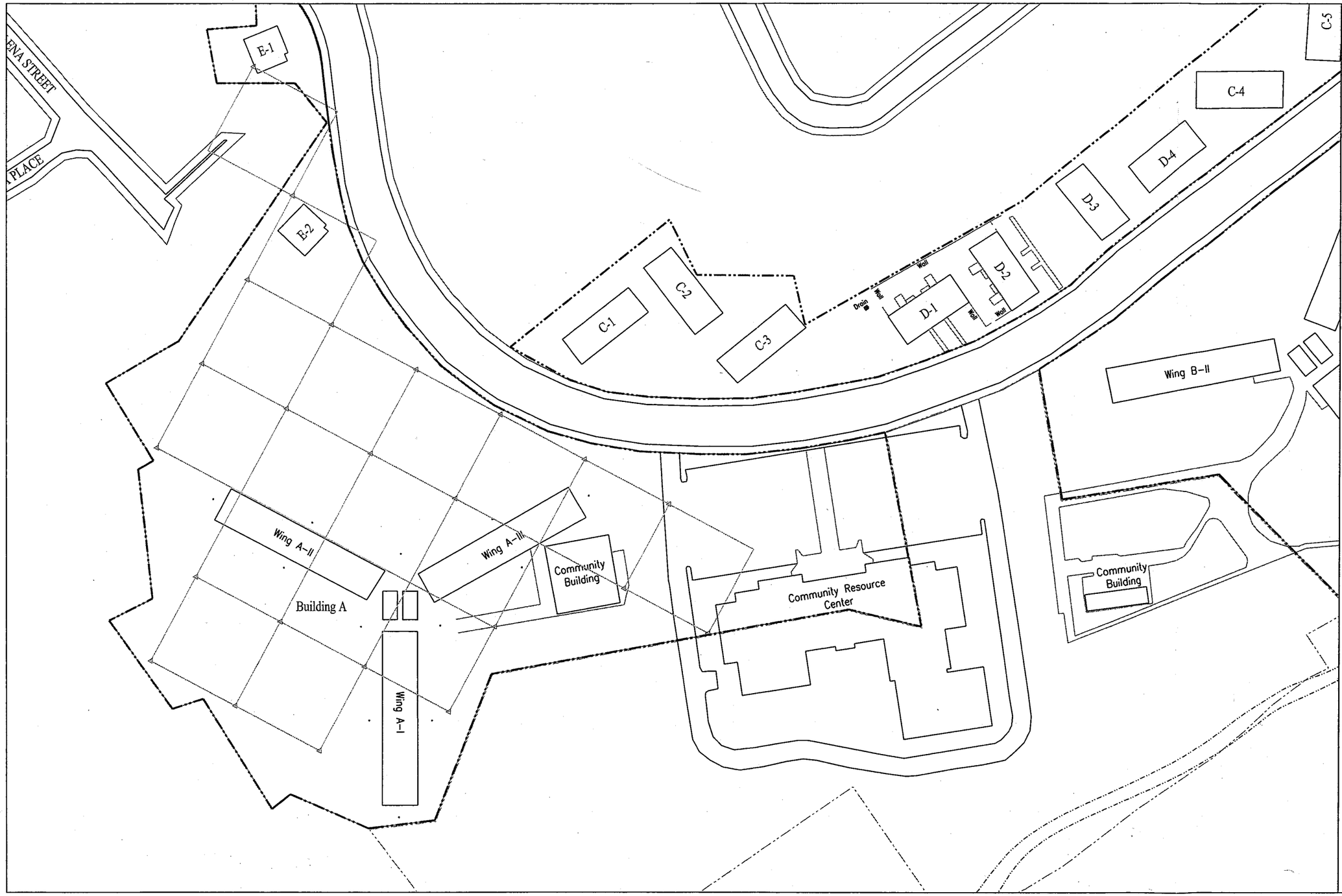
Prior to sampling, sample locations will be predetermined. For Building A area, 12 grab soil samples will be collected as close as possible to the building foundations and 23 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-1). Five (5) duplicate soil samples will be collected in Building A area at locations to be determined in the field.

For Building B area, 12 grab soil samples will be collected as close as possible to the building foundations and 19 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-2). Four (4) duplicate soil samples will be collected in Building B area at locations to be determined in the field.

Twelve (12) grab soil samples at Buildings D-1 and D-2 will be collected as close to the building foundations as possible and 12 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-3). In addition, four soil samples will be collected approximately 5 feet from these buildings and one (1) soil sample in the surface water drainage path near Buildings D-1 and D-2 to determine the spatial distribution of the contamination (Figure 4-3). Four (4) duplicate soil samples, at locations to be determined in the field, will also be collected in this area.

Surface soil samples will be identified and reconfirmed in the field with a tape measure and marked using survey tape and/or flagging on the ground surface or nearby vegetation. Prior to sampling, all debris and vegetation will be cleared from the sampling locations where possible and/or feasible. If the proposed sampling location cannot be sampled due to accessibility constraints, the proposed sampling location may be re-located to the nearest accessible location.

Sample locations will be documented with a Global Positioning System (GPS) unit where feasible, prior to the start of sampling. If a location cannot be recorded with a GPS unit, it will be documented by linear measurement in feet with a tape measurement and radial direction with a compass from the nearest obtainable GPS sample point landmark, or surveyed marker. Since all samples will be collected manually from 4 to 6 inches bgs only, no geophysical survey will be performed to determine the presence and location of general subsurface utilities under the proposed sampling locations. If a sampling point requires relocation, the new location will be documented with a GPS unit or tape measure and compass.



LEGEND

- Project Area Parcel Boundaries (15.273 acres) TMK:1-3-039:001
- Adjacent Parcel Boundary TMK: 1-3-039:007
- Stream
- Sampling Grid (100 foot interval)
- △ Unbias Sample Location
- • Bias Sample Location

Project Notes

1) 12 bias grab soil samples collected ~1 foot from building.
2) 23 composite soil samples collected from sampling grid nodes spaced approximately 100 feet apart.
3) 5 field duplicate samples to be collected.

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. Area of site calculated from Taxation Map Bureau, Territory of Hawaii Tax Map Zone 1 Sec 3 Plate 39 Drawing No. 2622, Dated 1946.
3. File:.Finai_Figure 4-1.dwg Date: 9/17/04

SOURCES

C&C Honolulu Tax Map Database, 2003

Hawaii and Community Development Corporation of Hawaii (HCDCH), Construction Management Map (detail), 1998

Aerial Photography 1971 and 1997, Air survey Hawaii

N

50 0 100

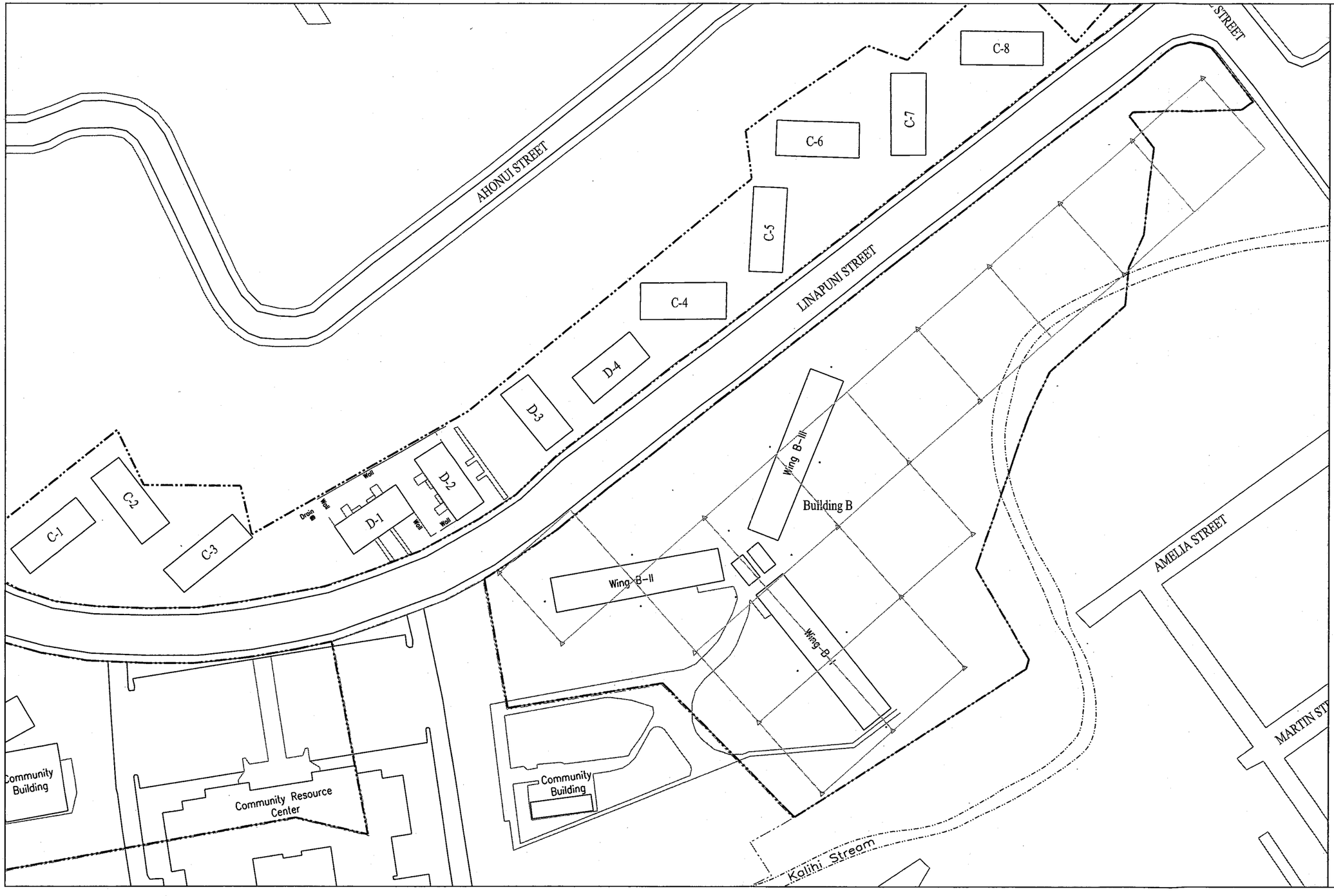
Feet

amec

Building A
Proposed Sampling Locations
Kuhio Park Terrace
Kalihi, Oahu

FIGURE

4-1



LEGEND

- Project Area Parcel Boundaries (15.273 acres) TMK:1-3-039:001
- Adjacent Parcel Boundary TMK: 1-3-039:007
- Stream
- Sampling Grid (100 foot interval)
- △ Unbias Sample Location
- • Bias Sample Location

Project Notes

1) 12 bias grab soil samples collected ~1 foot from building.
2) 19 composite soil samples collected from sampling grid nodes spaced approximately 100 feet apart.
3) 4 field duplicate samples to be collected.

NOTES

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2. Area of site calculated from Taxation Map Bureau, Territory of Hawaii Tax Map Zone 1 Sec 3 Plate 39 Drawing No. 2622, Dated 1946.
3. File:.Final_Figure 4-2.dwg Date: 9/17/04

SOURCES

C&C Honolulu Tax Map Database, 2003

Hawaii and Community Development Corporation of Hawaii (HCDCH), Construction Management Map (detail), 1998

Aerial Photography 1971 and 1997, Air survey Hawaii

N

50 0 100

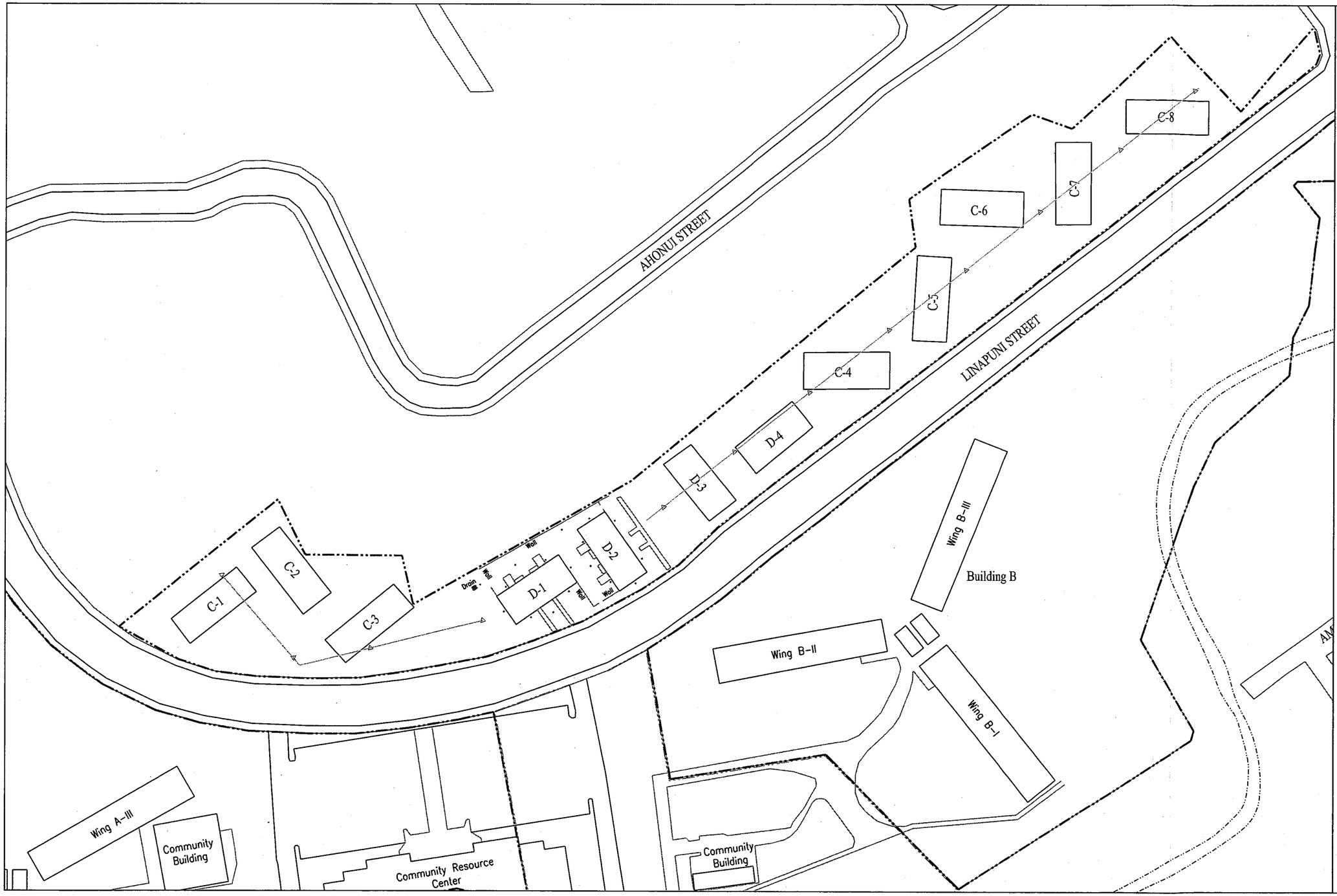
Feet

amec

Building B
Proposed Sampling Locations
Kuhio Park Terrace
Kalihi, Oahu

FIGURE

4-2



LEGEND

- Project Area Parcel Boundaries (15.273 acres) TMK:1-3-039:001
- Adjacent Parcel Boundary TMK: 1-3-039:007
- Stream
- Sampling Grid (100 foot interval)
- △ Unbias Sample Location
- • Bias Sample Location

Project Notes

1) 12 bias grab soil samples collected ~1 foot from buildings D-1 and D-2.
2) 4 bias grab soil samples collected ~5 feet from Buildings D-1 and D-2.
3) 12 composite soil samples collected from sampling grid nodes spaced approximately 100 feet apart.
4) 4 field duplicate samples to be collected.

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. Area of site calculated from Taxation Map Bureau, Territory of Hawaii Tax Map Zone 1 Sec 3 Plate 39 Drawing No. 2622, Dated 1946.
3. File:.Final_Figure 4-3.dwg Date: 9/17/04

SOURCES

C&C Honolulu Tax Map Database, 2003

Hawaii and Community Development Corporation of Hawaii (HCDCH), Construction Management Map (detail), 1998

Aerial Photography 1971 and 1997, Air survey Hawaii

N

50 0 100

Feet

amec

Buildings C and D
Proposed Sampling Locations
Kuhio Park Terrace
Kalihi, Oahu

FIGURE

4-3

In the event that unforeseen circumstances result in these sampling locations becoming inaccessible or result in the identification of other sampling locations with higher potential of identifying constituents, modification to the sampling locations will be made in the field. In this case, field personnel will use best professional judgment. Any deviations to this SAP will be documented in the field logbook and described in the Site Assessment Report.

4.1.2 Target Chemicals of Potential Concern

Due to the assumed historical use of the Site as agricultural land, target COPCs for all soil samples will include Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A. The target COPC list is highlighted in bold on Table 3-2.

4.2 WATER SAMPLING

Although water samples will not be collected from the Site (e.g., groundwater or surface water samples), an equipment rinsate water sample will be collected for quality control purposes. Rinsate water will consist of HPLC-grade water poured over pre-cleaned sampling equipment and collected in appropriate sample containers. The rinsate sample will be analyzed for the same analyte list as the soil samples collected with the sampling equipment (Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A).

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SECTION 5
REQUEST FOR ANALYSIS

It is estimated that a total of 110 samples, including duplicate and quality control samples, will be collected from the Site. Soil samples to be analyzed for pesticides, metals, and chlorinated herbicides will be analyzed by SGS Analytical. The sampling program will be initiated in a phased approached based on the planned revitalization master plan. The requested analytical parameters for each surface soil sample are presented in the subsections below.

5.1 ANALYSIS NARRATIVE

As discussed in Section 4 and shown in Figures 4-1, 4-2, and 4-3, a total of 95 primary and 13 field duplicate surface soil samples will be collected at the Site (Building A area = 35 primary and 5 duplicates, Building B area = 31 primary and 4 duplicates, and Buildings C and D area = 29 primary and 4 duplicates). All soil samples will be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A. Duplicate soil sample locations will be determined in the field. Information regarding container types, sample volumes, preservatives, special handling and analytical holding times for each parameter are included in Tables 5-1 and 5-2.

As enumerated in Tables 5-1, surface soil samples will be taken at 95 locations. Single volume soil samples collected at the following sample locations will be identified for use as laboratory QC soil samples (Matrix Spike/Matrix Spike Duplicate): A01, A20, B01, B20, D01, D20.

One water sample (equipment rinsate) will be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A. The rinsate sample will be collected from one of the pre-cleaned, disposable hand trowels prior to the collection of the surface soil samples.

Table 5-1
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SGS Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
A01*	4-6	Biased	1	1	1
A02	4-6	Biased	1	1	1
A03	4-6	Biased	1	1	1
A04	4-6	Biased	1	1	1
A05	4-6	Biased	1	1	1
A06	4-6	Biased	1	1	1
A07	4-6	Biased	1	1	1
A08	4-6	Biased	1	1	1
A09	4-6	Biased	1	1	1
A10	4-6	Biased	1	1	1
A11	4-6	Biased	1	1	1
A12	4-6	Biased	1	1	1
A13	4-6	Systematic Composite	1	1	1
A14	4-6	Systematic Composite	1	1	1
A15	4-6	Systematic Composite	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SGS Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
A16	4-6	Systematic Composite	1	1	1
A17	4-6	Systematic Composite	1	1	1
A18	4-6	Systematic Composite	1	1	1
A19	4-6	Systematic Composite	1	1	1
A20*	4-6	Systematic Composite	1	1	1
A21	4-6	Systematic Composite	1	1	1
A22	4-6	Systematic Composite	1	1	1
A23	4-6	Systematic Composite	1	1	1
A24	4-6	Systematic Composite	1	1	1
A25	4-6	Systematic Composite	1	1	1
A26	4-6	Systematic Composite	1	1	1
A27	4-6	Systematic Composite	1	1	1
A28	4-6	Systematic Composite	1	1	1
A29	4-6	Systematic Composite	1	1	1
A30	4-6	Systematic Composite	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SDG Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
A31	4-6	Systematic Composite	1	1	1
A32	4-6	Systematic Composite	1	1	1
A33	4-6	Systematic Composite	1	1	1
A34	4-6	Systematic Composite	1	1	1
A35	4-6	Systematic Composite	1	1	1
A36**	4-6	Field Duplicate	1	1	1
A37**	4-6	Field Duplicate	1	1	1
A38**	4-6	Field Duplicate	1	1	1
A39**	4-6	Field Duplicate	1	1	1
A40**	4-6	Field Duplicate	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SDG Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
B01*	4-6	Biased	1	1	1
B02	4-6	Biased	1	1	1
B03	4-6	Biased	1	1	1
B04	4-6	Biased	1	1	1
B05	4-6	Biased	1	1	1
B06	4-6	Biased	1	1	1
B07	4-6	Biased	1	1	1
B08	4-6	Biased	1	1	1
B09	4-6	Biased	1	1	1
B10	4-6	Biased	1	1	1
B11	4-6	Biased	1	1	1
B12	4-6	Biased	1	1	1
B13	4-6	Systematic Composite	1	1	1
B14	4-6	Systematic Composite	1	1	1
B15	4-6	Systematic Composite	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SDG Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
B16	4-6	Systematic Composite	1	1	1
B17	4-6	Systematic Composite	1	1	1
B18	4-6	Systematic Composite	1	1	1
B19	4-6	Systematic Composite	1	1	1
B20*	4-6	Systematic Composite	1	1	1
B21	4-6	Systematic Composite	1	1	1
B22	4-6	Systematic Composite	1	1	1
B23	4-6	Systematic Composite	1	1	1
B24	4-6	Systematic Composite	1	1	1
B25	4-6	Systematic Composite	1	1	1
B26	4-6	Systematic Composite	1	1	1
B27	4-6	Systematic Composite	1	1	1
B28	4-6	Systematic Composite	1	1	1
B29	4-6	Systematic Composite	1	1	1
B30	4-6	Systematic Composite	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SDG Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
B31	4-6	Systematic Composite	1	1	1
B32**	4-6	Field Duplicate	1	1	1
B33**	4-6	Field Duplicate	1	1	1
B34**	4-6	Field Duplicate	1	1	1
B35**	4-6	Field Duplicate	1	1	1
D01*	4-6	Biased	1	1	1
D02	4-6	Biased	1	1	1
D03	4-6	Biased	1	1	1
D04	4-6	Biased	1	1	1
D05	4-6	Biased	1	1	1
D06	4-6	Biased	1	1	1
D07	4-6	Biased	1	1	1
D08	4-6	Biased	1	1	1
D09	4-6	Biased	1	1	1
D10	4-6	Biased	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			SDG Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
D11	4-6	Biased	1	1	1
D12	4-6	Biased	1	1	1
D13	4-6	Biased	1	1	1
D14	4-6	Biased	1	1	1
D15	4-6	Biased	1	1	1
D16	4-6	Biased	1	1	1
D17**	4-6	Biased – drainage	1	1	1
D18	4-6	Systematic Composite	1	1	1
D19	4-6	Systematic Composite	1	1	1
D20*	4-6	Systematic Composite	1	1	1
D21	4-6	Systematic Composite	1	1	1
D22	4-6	Systematic Composite	1	1	1
D23	4-6	Systematic Composite	1	1	1
D24	4-6	Systematic Composite	1	1	1
D25	4-6	Systematic Composite	1	1	1

Table 5-1 (continued)
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Soil

Analyses Requested			**SDG Laboratory**		
Chemistry Type			ORGANICS		**INORGANICS**
Specific Analyses Requested			**Chlorinated Herbicides (RAP Method 8151A)**	**Pesticides (Method 8081)**	**Metals (Method 6010)**
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	**Sample Depth (Inches)**	**Sample Designation**	1, 4-ounce jar	1, 4-ounce jar	1, 4-ounce jar
D26	4-6	Systematic Composite	1	1	1
D27	4-6	Systematic Composite	1	1	1
D28	4-6	Systematic Composite	1	1	1
D29	4-6	Systematic Composite	1	1	1
D30**	4-6	Field Duplicate	1	1	1
D31**	4-6	Field Duplicate	1	1	1
D32**	4-6	Field Duplicate	1	1	1
D33**	4-6	Field Duplicate	1	1	1
BK1	4-6	Background Sample	1	1	1
BK2	4-6	Background Sample	1	1	1

* Laboratory Quality Control (QC) Sample
** All field duplicate and biased - drainage sample locations to be determined in the field.

A = Sample location prefix for samples collected near Building A
B = Sample location prefix for samples collected near Building B
D = Sample location prefix for samples collected near Buildings C and D
BK = Sample location prefix for background samples, locations will be field determined

Table 5-2
REQUEST FOR ANALYTICAL SERVICES
MATRIX = Low Concentration Water

Analyses Requested			SGS Laboratory		
Chemistry Type			ORGANICS		INORGANICS
Specific Analyses Requested			Chlorinated Herbicides (RAP Method 8151A)	Pesticides (Method 8081)	Metals (Method 6010)
Preservatives			Chill to 4°C	Chill to 4°C	Chill to 4°C, add nitric acid (HNO3) to pH <2
Analytical Holding Time(s)			Hold < 14 days	Hold < 14 days	Hold < 6 mos.
Contract Holding Time(s)			Hold < 14 days	Hold < 10 days	Hold < 35 days
Sample			# of Containers/ Analysis	# of Containers/ Analysis	# of Containers/ Analysis
Sample Location	Sample Depth (Inches)	Sample Designation	2 x 1-L amber glass bottle w/ Teflon septa	2 x 1-L amber glass bottle w/ Teflon septa	1 x 1-L polyethylene bottle
FQC01	NA	Equipment Rinsate Water - Trowel	1	1	1
TOTAL WATER ANALYSES			1	1	1

FQC = Field Quality Control Sample

SECTION 6
FIELD METHODS AND PROCEDURES

This section presents the field investigation procedures for the soil sampling effort. Surface soil samples will be collected from 4 to 6 inches bgs using disposable hand trowels. Field personnel shall wear clean disposable nitrile gloves when collecting samples. Field procedures are included for locating predetermined sampling points, collecting the soil samples, GPS surveying, and decontamination procedures. Where possible, complete references have been made to AMEC's standard operating procedures (SOPs). The applicable SOPs are attached as Appendix A. Proper sample storage and shipping procedures are discussed in Sections 7 and 9, respectively.

6.1 FIELD EQUIPMENT

The following equipment will be used for obtaining surface soil samples:

Equipment	Fabrication	Dedicated
Disposable Hand Trowels	Stainless Steel	Yes
1-gallon pail	Inert materials (i.e., paper)	Yes

6.2 SOIL SAMPLE COLLECTION

Surface soil sampling procedures are described in AMEC SOP *Soil Sampling* in Appendix A and are summarized below.

Soil Sampling Locations

Sample locations will be predetermined. For Building A area, 12 grab soil samples will be collected as close as possible to the building foundations and 23 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-1). Each sampling node will serve as the center for a 25-foot square that delineates the boundaries of a composite sampling grid. Composite soil samples will be collected at the corners and center of the grid at each sampling locations. Five (5) duplicate soil samples will be collected in Building A area at locations to be determined in the field.

For Building the B area, 12 grab soil samples will be collected as close as possible to the building foundations and 19 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-2). Four (4) duplicate soil samples will be collected in Building B area at locations to be determined in the field.

Twelve (12) grab soil samples at Buildings D-1 and D-2 will be collected as close to the building foundations as possible and 12 systematic composite soil samples from the grid nodes spaced approximately 100 feet apart (see Figure 4-3). In addition, four soil samples will be collected approximately 5 feet from these buildings and one (1) soil sample in the surface water drainage path near Buildings D-1 and D-2 to determine the spatial distribution of the contamination (Figure 4-3). Four (4) duplicate soil samples, at locations to be determined in the field, will also be collected in this area.

Surface soil samples will be identified and reconfirmed in the field with a tape measure and marked using survey tape and/or flagging on the ground surface or nearby vegetation. Prior to sampling, all debris and vegetation will be cleared from the sampling locations where possible and/or feasible. If the proposed sampling location cannot be sampled due to accessibility constraints, the proposed sampling location may be re-located to the nearest accessible location.

Sample locations will be documented with a GPS unit where feasible, prior to the start of sampling. If a location cannot be recorded with a GPS unit, it will be documented by linear measurement in feet with a tape measurement and radial direction with a compass from the nearest obtainable GPS sample point landmark, or surveyed marker.

Since all samples will be collected manually from 4 to 6 inches bgs only, no geophysical survey will be performed to determine the presence and location of general subsurface utilities under the proposed sampling locations. If a sampling point requires relocation, the new location will be documented with a GPS unit or tape measure and compass.

Surface Soil Sampling Procedures

Surface soil samples will be defined as soil collected from 4 to 6 inches bgs. A total of 108 surface soil samples (including duplicate samples) are anticipated to be collected. All 108 surface soil samples will be analyzed for Pesticides by USEPA Method 8081A,

Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A.

All surface soil samples will be collected using a pre-cleaned, disposable, stainless steel hand trowel. Samples will be homogenized using the same trowel in a sample-dedicated disposable 1-gallon pail. The pail will be composed of inert materials to minimize introduction of any bias in the analytical results. The homogenized soil will be placed into pre-cleaned, wide-mouthed glass jars that will be filled with no headspace or large voids. The jar will then be sealed with a tight fitting cap, labeled and custody sealed accordingly, and placed on ice in a cooler for shipment to the analytical laboratory. Excess soil will be used to backfill the sampling location.

6.3 WATER SAMPLING

Water sampling will be limited to one equipment rinsate sample collected for quality control purposes. Rinsate water will consist of HPLC-grade water poured over pre-cleaned sampling equipment and collected in appropriate sample containers. The rinsate samples will be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A.

6.4 DECONTAMINATION PROCEDURES

All sampling equipment anticipated to be used would be disposable. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal.

Should non-dedicated sampling equipment be used, general decontamination procedures for non-dedicated sampling equipment can be found in AMEC SOP, *Equipment Decontamination*, located in Appendix A.

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SECTION 7
SAMPLE CONTAINERS, PRESERVATION, AND STORAGE

Sample containers, quantities, preservation methods, volumes, and holding times will follow the guidelines presented in Tables 5-1 and 5-2 and documented in Section 5. The containers will be pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added to the containers by the manufacturer or laboratory prior to shipment of the sample containers to AMEC.

7.1 SOIL SAMPLES

Organics

Soil samples for Pesticides using USEPA Method 8081A and Chlorinated Herbicides using USEPA Method 8151A will be homogenized and transferred from the sample-dedicated homogenization pail into 4-ounce (oz), unpreserved, wide-mouth glass jars using dedicated trowels. For each sample, one 4-oz wide-mouth glass jar will be collected for the laboratory. The samples will be chilled to 4°C immediately upon collection.

Metals

Surface soil samples to be analyzed for Metals using USEPA Method 6010B/6020 will be homogenized and transferred from the sample-dedicated homogenization pail into 4-ounce (oz), unpreserved, wide-mouth glass jars using dedicated trowels. For each sample, one 4-oz wide-mouth glass jar will be collected for the laboratory. The samples will be chilled to 4°C immediately upon collection.

7.2 WATER SAMPLES

One equipment rinsate sample will be collected for quality control purposes. Rinsate water will consist of HPLC-grade water poured over pre-cleaned sampling equipment and collected in appropriate sample containers. The rinsate sample will be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A.

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SECTION 8
DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples at the Kuhio Park Terrace Brownfields Site during the Site Assessment, the AMEC sampling team will generate different types of potentially contaminated investigation derived waste (IDW) that include the following:

- Used personal protective equipment (PPE); and
- Disposable sampling equipment.

The USEPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the Office of Emergency and Remedial Response (OERR) Directive 9345.302 (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

IDW generated during the course of the field investigation will be handled in accordance with current USEPA guidelines described in the USEPA document *Management of Investigation-Derived Wastes During Site Inspections* (USEPA 1991a) and SOP, *IDW Management,* included in Appendix A.

Soil samples will be collected with disposable, pre-cleaned sampling equipment; IDW associated with surface soil sampling will be limited to the used disposable sampling equipment (DSE) and disposable PPE. Used PPE and DSE will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is designated for disposal that can still be reused, will be rendered inoperable before disposal in the refuse dumpster.

No potentially contaminated liquids are anticipated to be generated during this site assessment effort.

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SECTION 9
SAMPLE DOCUMENTATION AND SHIPMENT

The integrity of data obtained from samples collected during the field investigation depends on proper sample management and handling. Proper sample management includes sample labeling, which is the assignment of a specific identification number, and affixing proper identification and markings to the collected samples. Proper handling includes proper packing and transport of the sample containers.

9.1 FIELD NOTES

Sample management and handling are described in the *Record Keeping, Sample Labeling, and Chain-of-Custody* SOP and *Logbooks* SOP. These procedures, located in Appendix A, are summarized in the following sections.

9.1.1 FIELD LOGBOOKS

The field logbook serves as the primary record of field activities. Entries shall be made chronologically and in sufficient detail to allow the writer or a knowledgeable reviewer to reconstruct the applicable events. The field logbook shall be bounded with consecutively numbered and water repellent pages. The logbook shall be stored in a clean location and used only when outer gloves used for personal protective equipment have been removed.

Individual data forms may be generated to provide systematic data collection documentation. Entries on these forms shall meet the same requirements as entries in the logbook. At a minimum, names of all samples collected shall be included in the logbook even if recorded elsewhere.

Field notes are described in AMEC SOPs *Logbook, Record Keeping, Sample Labeling, and Chain-of-Custody*.

At a minimum, the following information will be recorded in either the field logbook or a separate sample log sheet during the collection of each sample:

- Sample location and description;
- GPS data file name;

- Sampler's name(s);
- Date and time of sample collection;
- Type of sample;
- Type of sampling equipment used;
- Field instrument readings and calibration; and
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.).

In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling:

- Time of arrival/entry on site and time of site departure;
- Other personnel on site;
- Summary of any meetings or discussions with tribal, contractor, or federal agency personnel;
- Deviations from sampling plans, site safety plans, and QC procedures; and
- Changes in personnel and responsibilities with reasons for the changes.

9.1.2 PHOTOGRAPHS

Photographs will be taken at the sampling locations and at other areas of interest on site or in the sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, and location; and
- Description of the subject photographed.

9.2 LABELING

Each sample container sent to the lab will have a unique sample identification label. The following information will be included on the sample label:

- Project name and location;
- Project number;
- Sample number;
- Date and time of collection;
- Analyses to be performed; and
- Initials of the sampler.

Two unique sample identification numbers will be assigned to each sample collected. Both identification numbers will be recorded in the sample logbook.

Laboratory Identification

Sample numbers provided to the laboratory will be five characters long, and coded as follows:

KPddd

Where,

KP The letter code designation for Kuhio Park Terrace.

ddd A three-digit number used for sequential numbering of samples.

For example, the third sample collected for herbicide analysis will be designated as sample number: KP003. This number will be recorded on the chain-of-custody (COC) record for each sample collected.

AMEC Sample Identification Numbers

An additional sample identifier to be assigned to each sample will be the AMEC sample identification number. This identifier provides useful information such as sample location and sample media type and is coded as follows:

KP-CCC-d-ee

Where,

KP Designates the Kuhio Park Terrace Brownfields project

CCC Identifies the sample location.

d Field QC type (see Table 9-1)

ee Number identifying the sample event (01 for the first event).

For example, the surface soil sample collected from location A23 at the KPT Site during the first sampling event will be designated as KP-A23-S-01. These characters will establish a unique sample identifier that can be used when evaluating data. QC sample designations will be noted in the field logbook. Table 9-1 describes the field QC designator types.

Table 9-1

FIELD QC TYPE DESIGNATIONS
KUHIO PARK TERRACE BROWNFIELDS SITE

Identifier	QC Sample Type	Description
S	Normal Sample	All non-QC Samples
D	Field Duplicate	Performance evaluation sample
Q	Laboratory QC Sample	Performance evaluation sample

Labels will be marked with waterproof ink and completed as much as possible prior to sample collection, then affixed to each sample container and taped with clear plastic tape.

9.3 Sample Chain Of Custody Forms and Custody Seals

All sample shipments for analyses will be accompanied by a COC which is used to document sample collection and each shipment to the laboratory for analysis. If multiple coolers are sent to the laboratory on a single day, a COC will be completed and sent with associated samples contained in each cooler.

The COC form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the

custody of the samples will be the responsibility of AMEC. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number.

The sample numbers for laboratory QC samples and duplicates will be documented in a field log book.

A self-adhesive custody seal will be placed across the lid of each sample. The shipping containers in which samples are stored (usually a sturdy picnic cooler or ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

9.4 PACKAGING AND SHIPMENT

Field personnel will ensure that the samples are kept at proper holding temperatures and packed to minimize possibility of sample container damage. For shipment, screw caps will be checked for tightness and affixed with custody seals. Glass containers will be wrapped in bubblewrap or other appropriate protection to prevent breakage during shipment. Additionally, the bottom of the cooler will be lined with bubble wrap and empty space in the cooler will be filled with bubble wrap or styrofoam peanuts to prevent movement and breakage during shipment. Ice will be added as described further below.

Immediately after collection, all samples will be placed in insulated coolers with ice until preparation for shipment later that day. Samples will then be shipped in coolers with fresh frozen blue ice blocks evenly placed around sample containers. If "wet" ice is used, it will be packed in sealable, double plastic bags and the drain plug of the cooler will be sealed with waterproof tape. Samples will be shipped on the same day of collection to meet holding times.

A temperature blank will not be included in each cooler. The laboratory will measure and record the temperature of the samples using a temperature laser-gauge on the exterior of the sample container upon receipt of each sample shipment.

Completed COC forms will be placed inside sealable storage bags and placed inside each sample cooler. Coolers will then be closed, sealed with waterproof tape, and the lid sealed with two custody seals to enable detection of tampering.

Because soil sample shipments from Hawaii to analytical laboratories in the continental United States must be inspected specifically by the United States Department of Agriculture (USDA), the field manager will ensure that proper and current USDA soil shipment clearance permits are available at the time of sample shipment. Field personnel will deliver samples to the chosen air freight company (generally DHL Worldwide Express (DHL) or Federal Express), contact USDA to inspect the shipment, and present the proper USDA soil permits and documentation to the inspectors.

SECTION 10
QUALITY CONTROL

This SAP has been prepared to provide instruction and guidance to ensure that sample chemical data collected in support of the Site soil sampling activities are scientifically valid, are of known quality that meet the established quality control (QC) objectives, are legally defensible, and support project objectives. The sections below outline methods and processes to meet these objectives.

10.1 FIELD QUALITY CONTROL SAMPLES

Laboratory QC analyses serve as a check on the precision and accuracy of analytical methods and instrumentation and potential contamination that may occur during laboratory sample preparation and analyses. Laboratory QC analyses will include field quality control samples such as rinsate blanks, field blanks, field duplicates, and temperature blanks. Field QC samples will be collected in accordance to SOPs, *Field QC samples* and *Performance Evaluation Samples*, located in Appendix A. The subsections below summarize these procedures.

The location of field QC samples will be determined in the field. Field QC sample location selection will be based on the following criteria:

- Based on field observation, field QC samples will be selected from locations where the soils appear visually stained or discolored or stressed vegetation occurs.
- If a biased selection cannot be determined based on field observations, field QC samples will be selected systematically at a rate of one duplicate sample per every 10 samples.

10.1.1 Assessment of Field Contamination (Blanks)

Field contamination is usually assessed through the collection of different types of blanks. Equipment blanks are obtained by passing HPLC-grade water over or through the decontaminated equipment used for sampling. They provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample

containers, transit, and the laboratory. Field blanks are sample containers filled in the field. They help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination from shipping and the laboratory, and are for volatile organic compounds only. USEPA Region IX recommends that equipment blanks be collected, where appropriate (e.g., where either disposable or dedicated equipment is used). Field blanks are next in priority, and trip blanks next. Only one type of blank must be collected per event, not all three.

10.1.1.1 Equipment Blanks

An equipment rinsate blank will be collected to evaluate equipment cleanliness by pouring HPLC solvent-free water (for organics) or deionized water (for inorganics) over sampled dedicated sampling equipment prior to use. The rinsate blank will be collected (from the disposable stainless steel hand trowel) and will be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A. The equipment rinsate blank will be labeled, preserved, packaged, and sealed in the manner previously described in Section 9 of this SAP. A separate sample number will be assigned and the rinsate sample will be submitted to the laboratory without indication that they are "blank samples" (i.e., they will be submitted "blind").

10.1.1.2 Field Blanks

Field blanks will not be collected because laboratory QC requirements are fulfilled by the collection of an equipment blank.

10.1.1.3 Trip Blanks

Trip blanks will not be collected because no volatile organic compound analyses are requested for this Site Assessment.

10.1.1.4 Temperature Blanks

A temperature blank will not be included in each cooler. The laboratory will measure and record the temperature of the samples using a temperature laser-gauge on the exterior of the sample container upon receipt of each sample shipment.

10.1.2 Assessment of Sample Variability (Field Duplicate or Co-located Samples)

Duplicate samples are collected simultaneously with a standard sample from the same source under identical conditions into separate sample containers. Field duplicates will either consist of a homogenized sample divided in two or a co-located sample. Each duplicate portion should be assigned its own sample number so that it will be blind to the laboratory. A duplicate sample is treated independently of its counterpart in order to assess laboratory performance through comparison of the results. At least 10% of samples collected per event should be field duplicates. At least one duplicate should be collected for each sample matrix, but their collection can be stretched out over more than one day (e.g., if it takes more than one day to reach 10 samples). Every group of analytes for which a standard sample is analyzed will also be tested for in one or more duplicate samples. Duplicate samples should be collected from areas of known or suspected contamination. Since the objective is to assess variability due to sampling technique and possible sample heterogeneity, source variability is a good reason to collect co-located samples, not to avoid their collection.

Duplicate soil sample locations will be selected in the field. It will be attempted to selected locations that are suspected to exhibit moderate concentrations of contaminants (i.e., visible staining or stressed vegetation observed).

Soil samples to be analyzed for Pesticides by USEPA Method 8081A, Metals by USEPA Method 6010B/6020, and Chlorinated Herbicides by USEPA Method 8151A will be homogenized with a trowel in a sample-dedicated 1-gallon disposable pail composed of inert material. Homogenized material will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., pesticides) will be filled sequentially before jars designated for another analysis are filled (e.g., metals).

Field duplicate samples will consist of either collocated or replicate samples. Replicates are identical samples that are typically homogenized from the same core sample. Replicate samples will be collected simultaneously with a sample from the same source under identical conditions into separate sample containers. Collocates are samples collected next to each other (i.e., laterally or vertically, in separate containers, not homogenized). Both collocated and replicated samples will be collected in the field.

A duplicate sample is treated independently of its counterpart in order to assess laboratory performance through comparison of the results. At least 10% of the samples collected per event will be duplicates, and at least one duplicate will be collected for each sample matrix. The duplicate samples will be analyzed for the same analyses as the standard samples. Duplicate samples should be collected from areas of known or suspected contamination.

Duplicate samples will be collected in the field based on the following criteria:

- Based on field observation, duplicate samples will be selected from locations where the soils appear visually stained or discolored or stressed vegetation occurs.
- If a biased selection cannot be determined based on field observations, duplicate samples will be selected systematically at a rate of one duplicate sample per every 10 samples.

10.2 BACKGROUND SAMPLES

Background samples are used to determine relative background concentrations for comparison with on-site data. Background samples are collected in situations where the possibility exists that there are native or ambient levels of one or more target analytes present or where one aim of the sampling event is to differentiate between on-site and off-site contributions to contamination. One or more locations are chosen which should be free of contamination from the site or sampling location itself, but have similar geology, hydrogeology, or other characteristics to the proposed sampling locations that may have been impacted by site activities. For example, an area adjacent to but removed from the site, upstream from the sampling points, or up gradient or cross gradient from the groundwater under the site. Not all sampling events require background samples.

Two (2) background soil samples will be collected for this Site Assessment Study. The background sampling points will be located in an off-site area that has similar geology, hydrogeology, and topography as the KPT Brownfields Site. The locations will be determined in the field during site assessment activities.

10.3 Field Screening, Confirmation, and Split Samples

Not to be performed for this Site Assessment Study.

10.4 Laboratory Quality Control Samples

Laboratory quality control (QC) samples are analyzed as part of standard laboratory practice. The laboratory monitors the precision and accuracy of the results of its analytical procedures through analysis of QC samples. In part, laboratory QC samples consist of matrix spike/matrix spike duplicate (MS/MSD) samples for organic analyses. The term "matrix" refers to use of the actual media collected in the field (e.g., routine soil and water samples). Laboratory QC samples are an aliquot (subset) of the field sample. They are not separate samples, but a special designation of an existing sample. The laboratory QC samples will be analyzed for the same analyses as the standard samples.

Laboratory QC samples will be collected in accordance to SOP, *Laboratory QC Samples (water, soil)*, located in Appendix A and summarized below.

A routinely collected soil sample (a full 4-oz sample jar) contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected.

The designation "Laboratory QC" will be written on the COC record or packing list, and sample container labels to alert the laboratory as to which sample is to be used for QC analysis.

At a minimum, one laboratory QC sample is required per 14 days or one per 20 samples (including blanks and duplicates), whichever is greater. If the sample event lasts longer than 14 days or involves collection of more than 20 samples per matrix, additional QC samples will be designated.

For this sampling event, samples collected at the following locations will be the designated laboratory QC samples:

- A01;
- A20;
- B01;
- B20;
- D01; and
- D20.

These locations were selected because a minimum of 6 laboratory QC samples need to be collected. In the absence of any previous analytical data to justify a biased location selection, the first sample to be collected from each area will be designated for laboratory QC analyses.

SECTION 11
FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the HDOH Project Manager will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

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SECTION 12
FIELD HEALTH AND SAFETY PROCEDURES

Field personnel will adhere to the health and safety procedures detailed in the [Site-Specific Health and Safety Plan] attached as Appendix B to this SAP. It is anticipated that all fieldwork will be performed in Level D PPE that will include: safety glasses, steel toed boots, and nitrile and leather gloves. Potential hazards that may be encountered include heat stress, slips, trips, and falls, and exposure to insects. The nearest hospital is Kuakini Medical Center located at 347 North Kuakini Street in Honolulu. Kuakini Medical Center is located east of Liliha Street and north of School Street and the hospital phone number is: (808) 536-2236. The hospital route map is located in Appendix B (Site-Specific Health and Safety Plan) as Figure 2. All emergency response services will be reached by calling 911.

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SECTION 13
REFERENCES

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Site-specific Health and Safety Plan for Hazardous Waste Operations Kuhio Park Terrace Brownfields

Prepared for

State of Hawaii, Department of Health
Hazard Evaluation and Emergency Response Office
919 Ala Moana Boulevard, Room 206
Honolulu, Hawaii 96814

Prepared by

AMEC Earth & Environmental, Inc.
680 Iwilei Road, Suite 660
Honolulu Hawaii 96817
(808) 545-2462

July 2004
Project No. 3-251-90003

HEALTH AND SAFETY PLAN

FOR

SITE ASSESSMENT
AT KUHIO PARK TERRACE BROWNSFIELDS
KALIHI, HAWAII

REVIEW AND APPROVALS:

Prepared by:

Industrial Hygienist
Rachel Morishige

5/22/03
Date

Approved by:

Associate
Garry Rossing, CIH

5/19/03
Date

Project Manager
Liza Liew, P.E.

5/22/03
Date

This Site-specific Health and Safety Plan has been developed in accordance with OSHA 29 CFR 1910.120 and has been streamlined to avoid duplication of existing AMEC documents.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Earth & Environmental, Inc.
ANSI	American National Standards Institute
AST	aboveground storage tank
bgs	below ground surface
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
dBA	decibels (A-weighted scale)
DOT	Department of Transportation
EC	Emergency Coordinator
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
FM	Field Manager
FT	field trailer
GPR	ground penetrating radar
HAZWOPER	Hazardous Waste Operations and Emergency Response
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
HSP	Health and Safety Plan
IDLH	Immediately Dangerous to Life or Health
IDW	investigation-derived waste
IPA	isopropyl alcohol
MSDS	material safety data sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PE	polyethylene
PM	Project Manager
PPE	personal protective equipment
QA/QC	quality assurance/quality control
ROC	record of change
SAP	Sampling and Analysis Plan
SCBA	self-contained breathing apparatus
SHE	Safety, Health, and Environment

SHSC	Site Health and Safety Coordinator
SOP	standard operating procedure
SPF	Sun Protection Factor
SZ	Support Zone
TWA	time-weighted average
TZ	Transition Zone
UST	underground storage tank
V	vehicle
WP	Work Plan

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

Client:
State of Hawaii Department of Health

Client Contact:
Melody Calisay

Site Name & Location:
Kuhio Park Terrace Brownfields Site

Client Tel. #:
(808) 586-7576

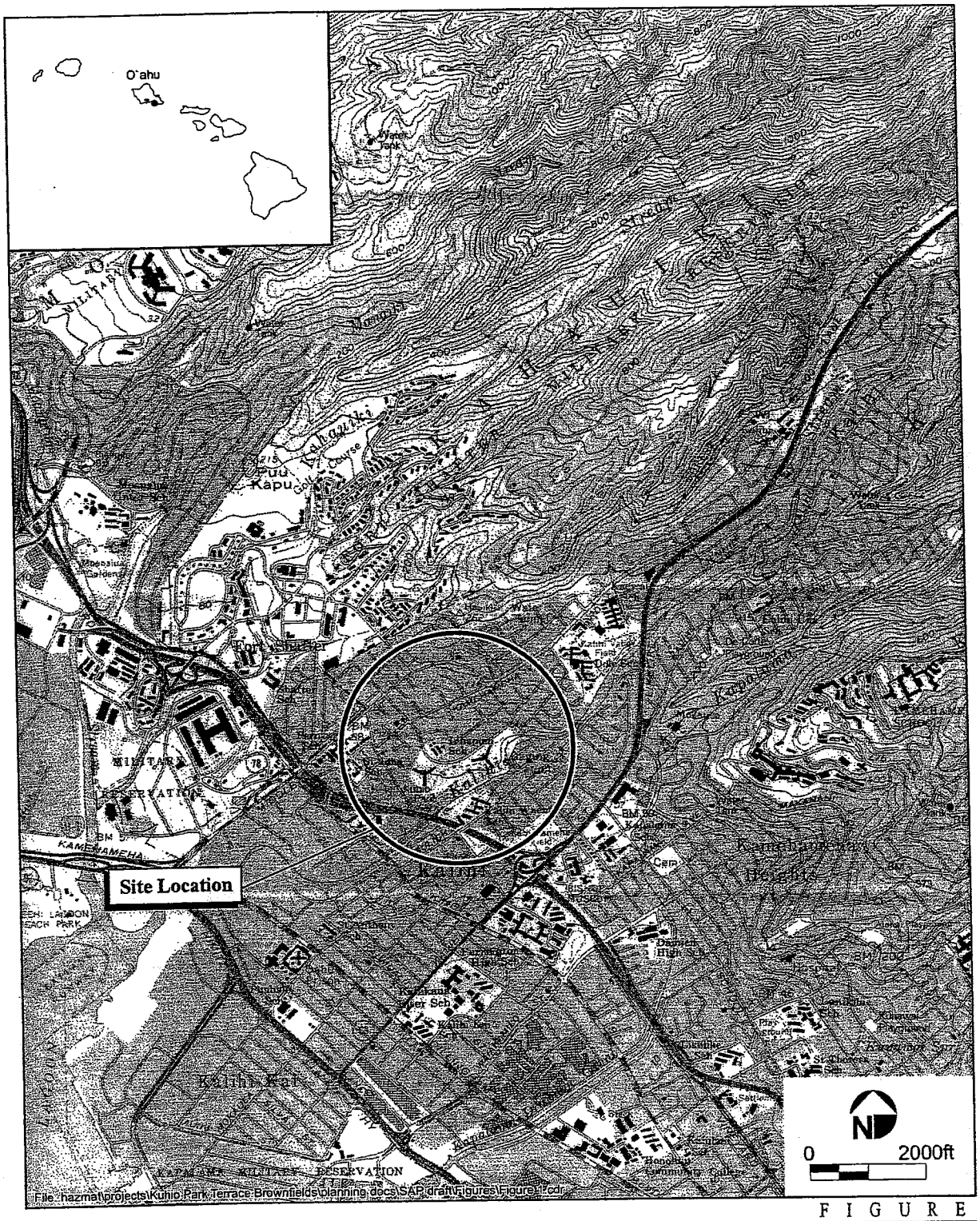
Field Manager:
Steffany Toma

Project Manager:
Liza Liew

Mobile Tel.#:
(808) 306-4415
(See also Emergency Call List)

1.2 SITE DESCRIPTION AND FEATURES

Kuhio Park Terrace (TMK 1-3-39:01) consists of an irregularly shaped 15.2-acre parcel of land in Kalihi, Hawaii (Figure 1). The Site is bound by School Street to the northeast, Kalihi Stream to the southeast, and the Kuhio Homes development to the west. The Site is located in a heavily developed residential area. The Kuhio Park Terrace development includes two 16-story reinforced concrete towers with three wings radiating from a central service core. The two high-rises are referred to as Buildings A and B. In addition to the two high-rises, the Site also contains 14 one-story concrete townhouse buildings, two of which are Buildings D-1 and D-2.



FIGURE

SITE LOCATION MAP
Kuhio Park Terrace Site
Honolulu, Hawaii

1

1.3 BACKGROUND/SITE HISTORY

A search of historical aerial photographs showed that the property was used for public housing since the late 1940's. Approximately 62 low-rise townhouse buildings can be seen in an aerial photograph of the Site from February 16, 1949 (RM Towill, 1949). Successive photographs show that the Site remained the same through August 1962. In an aerial photograph dated November 20, 1963, these low-rise townhouses were gone and the two 16-story high-rises were under construction. New low-rise townhouses were also depicted in the same photograph, presumably the current Buildings C, D, and E series. The structures onsite today appear the same as in the November 1963 photograph. Only landscaping and smaller, non-residential structures have changed since 1963. It is assumed that the land was historically used for agricultural purposes, although no documentation of the particular crops could not be located.

Tax records indicated that the property (TMK 1-3-39:01) was transferred on April 9, 1952 from the Federal Public Housing Authority (FPHA) to the Hawaii Housing Authority (HHA). In 1998, the HHA was restructured and renamed the Housing and Community Development Corporation of Hawaii (HCDCH). The HCDCH is still the current owner of the property.

HCDCH is applying for $35 million in HUD HOPE VI funds for the revitalization of Kuhio Park Terrace. The major redevelopment includes demolishing all of the current structures onsite and building several new low and mid-rise apartments and single-family dwellings. Additional proposed land uses include elderly housing, community services, playgrounds, and basketball courts.

A site visit on March 20, 2003 by AMEC and DOH revealed that the area around Buildings D-1 and D-2 has been landscaped by the local community and is now used to grow indigenous flowers and organic herbs used for consumption. The landscaping around Buildings A and B include grass and shrubs. No visibly clear soil contamination was found on the site walk.

1.4 SCOPE OF WORK/PLANNED SITE ACTIVITIES

The goal of this Site investigation is to assess potential soil impacts from contamination. It is anticipated that the project will run for a duration of approximately three months, with the initial field investigation lasting one week. Planned site activities include the following tasks, listed in the sequence of occurrence:

1. Collection of soil samples at 50 locations using disposable stainless trowels. Samples will be collected at 0-6" below ground surface (bgs).

1.5 SCHEDULED ON-SITE PERSONNEL

Substitutions will be made with similarly qualified personnel; the Record of Change (ROC) must reflect all personnel changes (see Appendix 2 for form).

SCHEDULED ON-SITE PERSONNEL*

NAME	COMPANY	PROJECT TITLE
Steffany Toma	AMEC	Project Manager/Site H&S Coordinator
Cherilyn Domingo	AMEC	Geologist
Jamie Anderson	AMEC	Geologist

* Note that all personnel arriving or departing the site should log in and out on the Employee/Visitor Daily Roster (Appendix 2). All personnel requiring access to controlled work areas must have completed the training and medical administrative control requirements.

1.6 PERSONNEL RESPONSIBILITIES

Site Health and Safety Coordinator (SHSC)

Reports jointly to the Corporate Safety, Health, and Environment Director (Corporate SHE Director) and the Field Manager (FM) for all aspects of the project and is the primary contact for health and safety during all field activities. Establishes work zones, evacuation routes, and assembly areas. Makes the day-to-day decision to modify levels of protection

provided in the Health and Safety Plan (HSP) based on site conditions or monitoring data. Provides necessary support to the Emergency Coordinator (EC) (see Project or Field Manager below). Has the authority to stop all work if conditions are judged to be hazardous to on-site personnel or the public, and reports and investigates accidents and near misses. Other specific responsibilities are detailed within Section 3 of Volume II, Comprehensive Field Project Health and Safety Program, of the Corporate Safety, Health, and Environment Manual (Corporate SHE Manual).

The SHSC or designee must carefully document the implementation of this HSP by maintaining the project health and safety files.

Corporate Safety, Health, and Environment Director (Corporate SHE Director)
Responsible for the review and approval of the HSP and for coordinating the implementation of health and safety procedures through supervision/direction of the SHSC. Responsible for approval of all changes made to this HSP.

Project Manager or Field Manager (PM or FM)
The project or field manager (PM or FM) is responsible for all field activities, for enforcing safe work practices, and for ensuring that daily tailgate meetings are conducted (either by the PM or FM, SHSC, or a rotation of field team members and subcontractor team members). Serves as the EC in emergency situations. The PM or FM assumes (or assigns to a qualified person) the SHSC duties and responsibilities when the SHSC is not on the site.

He/she is responsible for conducting accident and near-miss investigations and for submitting the Supervisor's Report of Injury or Illness and First Aid Incident Report (Appendix 2) to the Corporate SHE Director within 24 hours of a significant incident.

Technical Staff
All AMEC and subcontracting personnel are responsible for compliance with this HSP in its entirety. They are responsible for taking all reasonable precautions to prevent injury to themselves and to their fellow employees and for being alert to potentially harmful situations. Technical staff members are expected to perform only those tasks that they believe can be done safely and to immediately report any accidents, near misses, and/or unsafe conditions to the SHSC or the FM.

Subcontractors

Responsible for the conduct of their personnel while on the site and ensuring that personnel comply with this HSP, notifying the SHSC of any special medical conditions that could be affected by site conditions (e.g., allergies, diabetes, etc.), and correcting any unsafe acts/conditions that are identified by the PM, FM, or SHSC.

1.7 REQUIRED ON-SITE SIGNAGE AND POSTINGS

The following information is required to be posted in a field office in a conspicuous area, preferably near the telephone:

- Federal Occupational Safety and Health Administration (OSHA) Poster or state equivalent (8½ x 14 inches minimum)
- Hospital Route Map
- Emergency Call List
- Material Safety Data Sheet (MSDS) Availability
- Location of OSHA 200 Log (centralized)

2.0 HAZARD EVALUATION

Chemical, physical, energy, biological, and operational safety hazards anticipated during this project will be evaluated in the following tables and the sections that follow Section 3.1. The tables provide details that support the task-specific hazard analyses. Table 1 provides a site characterization overview of the contaminants of concern; Table 2 provides chemical properties and exposure assessment data; and Table 3 summarizes the physical and operational safety hazards and control measures identified for this project. A complete hazard analysis of each site work task and the list of protective measures completes this section of hazard evaluation. Further details of specific control measures for these hazards are presented in Section 3.0, Personnel Protection.

2.1 CHEMICAL EXPOSURE

The primary entry routes of potential contaminants and hazardous materials on the site include inhalation of vapors and dusts, skin contact with contaminated materials, and ingestion of airborne dusts or materials from hand-to-mouth contact due to inadequate personal hygiene. To minimize these exposure pathways, dust suppression techniques will be employed by the on-site subcontractor, and the SHSC will periodically monitor for airborne contaminants in the work and perimeter areas. In addition, all required personal protective equipment (PPE) as specified in Section 2.4, Hazard Analysis of Each Site Work Task, will be worn, and personal hygiene will be carefully monitored.

The following categories of contaminants of concern under investigation may be present at the site:

• Organochlorine Pesticides	• Carbamate Pesticides	• Urea Pesticides
• Chlorinated Herbicides	• Organophosphorus Herbicides	• Triazine Herbicides
• Arsenic	• Lead	• Cadmium
• Mercury	•	•

Table 1

SITE CHARACTERIZATION

ANTICIPATED PHYSICAL STATE OF CONTAMINANT(S):

( ) Liquid
(X) Solid
( ) Sludge
( ) Gas/Vapors
( ) Unknown
( ) Other _____

Notes: _____

MATRIX:

(X) Surface soils
( ) Soils at depth
( ) Surface water
( ) Groundwater
( ) Free product
( ) Other _____

Notes: _____

POTENTIAL HAZARDOUS PROPERTIES:

( ) Corrosive
(X) Toxic
( ) Inert
( ) Asphyxiant
( ) Flammable/Combust.
( ) Volatile
(X) Carcinogenic
( ) Compressed gas
( ) Radioactive
( ) Reactive
( ) Unknown
( ) Other _____

Notes: _____

CONTAINER/STORAGE SYSTEM INFORMATION:

( ) Tanks _____
( ) Drums _____
( ) Pipes _____
( ) Quantity _____
( ) Landfills/Dumps
( ) Impoundments
( ) Size/capacity _____
( ) Surface
( ) Subsurface
( ) Uncontainerized
( ) In-Service
( ) Other _____

Notes: _____

CONDITION OF CONTAINER/STORAGE SYSTEM(S):

( ) Sound/Undamaged
( ) Deteriorated/Unsound
( ) Unknown
( ) Confirmed leaks
( ) Other _____
( ) N/A
( ) Suspected leaks

Notes: _____

Table 1 (Continued)

SITE CHARACTERIZATION

ORIGIN OR INDUSTRIAL APPLICATION OF CHEMICALS OF CONCERN:

Industrial Process

( ) Manufacturing
( ) Maintenance/Repair
( ) Painting/Coating
( ) Power Generation
(X) Prev. Use
( ) Storage
( ) Other _____
( ) N/A

Notes: _____

Chemicals Used or Identified

( ) Acids
( ) Caustics
( ) Halogen
( ) Other: _____
(X) Metals
(X) Pesticides
( ) PCBs
( ) Phenols
( ) Paints
( ) Solvents

Notes: _____

Oils/Fuels

( ) Fuel Oil
( ) Waste Oil
( ) Hydraulic Oil
( ) AVGAS
( ) MOGAS
( ) Jet Fuel
( ) Gasoline
( ) Leaded
( ) Other _____

Notes: _____

Sludges

( ) Metal sludges
( ) Other: _____
( ) Oily sludges
( ) Septic sludges

Notes: _____

Solids

( ) Asbestos
( ) Other: _____
( ) Sandblast grit
( ) Landfill refuse

Notes: _____

GENERAL NOTES: _____

Table 2

CHEMICAL HAZARD PROPERTIES AND EXPOSURE INFORMATION

CHEMICAL NAME/ SYNONYM	ACGIH TLV TWA	Notations	TLV Basis	OSHA PEL	STEL (ST) c CEILING	IDLH	IP(eV)	LEL/ UEL	ROUTE/ SYSTEMS**	
									Route	Symptoms
Metals										
Arsenic (inorganic compounds)	0.01 mg/m^3	Human carcinogen	Cancer (lung, skin); lung	0.5 mg/m^3	0.002 mg/m^3 [15 min]	5 mg/m^3	NA	NA/NA	Inh Abs Ing Con	Ulceration of nasal septum, derm, GI disturbances, peri neur, resp irrit, hyperpig of skin, [carc]
Cadmium Dust and compounds	0.002 mg/m^3 respirable	Suspected human carcinogen	Cancer; kidney; metal fume fever	0.005 mg/m^3 respirable	None	9 mg/m^3	NA	NA/NA	Inh Ing	Pulm edema, dysp, cough, chest tight, subs pain; head; chills. musc aches; nau, vomit, diarr; anor, emphy, prot, mild anemia; [carc]
Lead, elemental and inorganic compounds	0.05 mg/m^3	Animal carcinogen	CNS; GI; blood; kidney; reproductive	0.05 mg/m^3	None	100 mg/m^3	NA	NA/NA	Inh Ing Con	Weak, lass, insom; facial pallor; pal eye, anor, low-wgt. malnut; constip, abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy; nephropathy; irrit eyes; hypertension
Mercury (inorganic forms including metallic mercury)	0.025 mg/m^3	Skin	CNS; kidney; reproductive	0.01 mg/m^3	0.03 mg/m^3	10 mg/m^3	NA	NA/NA	Inh Abs Ing Con	Irrit eyes, skin; cough, chest pain, dysp, bron pneuitis; tremor, insom, irrity, indecision, head, ftg, weak, stomatitis, salv; GI dist, anor, low-wgt; prot
Pesticides (fungicides, insecticides, herbicides, rodenticides)										
Aldrin	0.25 mg/m^3	Skin	Liver	None	0.25 mg/m^3	25 mg/m^3	None	NA/NA	Inh Abs Ing Con	Head, dizz, nau, vomit, mal; myoclonic jerks of the limbs; clonic tonic convuls; coma, hema, azotemia; [carc]
Atrazine 2-Chloro-4-ethylamino-6-isopropylamino-s-triazine	5 mg/m^3	Not Classifiable as a Human Carcinogen	Irritation	None	None	None	NA	NA/NA	Inh Ing Con	Irrit eyes, skin; derm, sens skin; dysp, weak,inco, salv; hypothermia; liver inj
2,4-D (dichlorophenoxy-acetic acid)	10 mg/m^3	None	Irritation	None	10 mg/m^3	100 mg/m^3	None	NA/NA	Inh Abs Ing Con	Weak, stupor, hyporeflexia, musc twitch; convuls, derm; in animals:liver, kidney inj
Carbaryl	5 mg/m^3	Not Classifiable as a Human Carcinogen	Cholinergic; reproductive	None	None	100 mg/m^3	None	NA/NA	Inh Abs Ing Con	Miosis, blurred vision, tear; chin, sakv; sweat; abdom cramps, nau, vomit, diarr; tremor; cyan; convuls; irrit skin; possible repro effects

Table 2 (Continued)

CHEMICAL HAZARD PROPERTIES AND EXPOSURE INFORMATION

CHEMICAL NAME/ SYNONYM	ACGIH TLV TWA	Notations	TLV Basis	OSHA PEL	STEL (ST) C CEILING	IDLH	IP(eV)	LEL/ UEL	ROUTE/ SYSTEMS**	
									Route	Symptoms
Chlordane	0.5 mg/m^3	Skin	Seizures; liver	0.5 mg/m^3	None	100 mg/m^3	None	NA/NA	Inh Abs Ing Con	Blurred vision; conf, ataxia, delirium; cough; abdom pain, nau, vomit, diarr; irrity, tremor, convuls; anuria; in animals; lung, liver, kidney damage; [carc]
Dalapon (propionic acid)	10 ppm	None	Irritation	None	None	None	10.24 eV	12.1%/ 2.9%	Inh Abs Ing Con	Irrit eyes, skin, nose, throat, resp syst; epis; derm; finger nail damage; irrit GI tract, heart, liver, kidney damage
DDT	1 mg/m^3	Animal carcinogen	Seizures; liver	None	1 mg/m^3	500 mg/m^3	None	NA/NA	Inh Abs Ing Con	Irrit eyes, skin, pares tongue, lips, face; tremor; appre, dizz, conf, mal, head, ftg; convuls; paresis hands, vomit; [carc]
Dieldrin	0.25 mg/m^3	Skin	Liver; CNS	None	0.25 mg/m^3	50 mg/m^3	None	NA/NA	Inh Abs Ing Con	Head, dizz; nau, vomit, mal, sweat; myoclonic limb jerks; clonic, tonic convuls; coma; [carc]; in animals:liver; kidney damage
Diquat (respirable)	0.1 mg/m^3	Skin	Irrit; eye	None	None	ND	None	NA/NA	Inh Abs Ing Con	Irrit eyes, skin, muc memb, resp sys; rhin, epis; skin burns, nau, vomit; diarr, mal; kidney, liver inj; cough, chest pain, dysp, pulm edema; tremor; convuls; delayed healing of wounds
Diuron 3-(3,4-Dichlorophenyl)-1,1-dimethylurea	10 mg/m^3	Not Classifiable as a Human Carcinogen	Irritation; blood	None	None	None	None	NA/NA	Inh Ing Con	Irrit eyes, skin, nose, throat; in animals; anemia, methemo
Endrin	0.1 mg/m^3	Skin	CNS; liver	None	0.1 mg/m^3	2 mg/m^3	None	NA/NA	Inh Abs Ing Con	
Heptaclor	0.05 mg/m^3	Skin, animal carcinogen	CNS; liver; blood	None	0.5 mg/m^3	35 mg/m^3	None	NA/NA	Inh Abs Ing Con	
Malathion	10 mg/m^3	Skin	Cholinergic; CNS; neuropathy, vision	None	15 mg/m^3	250 mg/m^3	None	NA/NA	Inh Abs Ing Con	
Paraquat (respirable)	0.1 mg/m^3	None	Lung, irritation	None	0.5 mg/m^3	1 mg/m^3	None	NA/NA	Inh Abs Ing Con	Irrit eyes, skin, nose, throat, resp syst; epis; derm; finger nail damage; irrit GI tract, heart, liver, kidney damage

Table 2 (Continued)

CHEMICAL HAZARD PROPERTIES AND EXPOSURE INFORMATION

CHEMICAL NAME/ SYNONYM	ACGIH TLV TWA	Notations	TLV Basis	OSHA PEL	STEL (ST) / CEILING	IDLH	IP(eV)	LEL/ UEL	ROUTE/ SYSTEMS** Route	Symptoms
Parathion	0.1 mg/m^3	Skin	Chloinergic	None	0.15 mg/m^3	10 mg/m^3	None	NA/NA	Inh Abs Ing Con	
Pentachlorophenol (PCP)	0.5 mg/m^3	Skin, animal carcinogen	CVS; CNS	0.5 mg/m^3 (skin)	None	2.5 mg/m^3	NA	NA/NA	Inh Abs Ing Con	Irrit eyes, nose, throat; sneeze, cough; weak, anor, low-wgt; sweat; head, dizz; nau, vomit; dysp, chest pain; high fever; derm
Strychnine	0.15 mg/m^3	None	CNS	None	0.15 mg/m^3	3 mg/m^3	None	NA/NA	Inh Abs Ing Con	
2, 4, 5T (2,4,5 trich-lorophenoxyacetic acid)	10 mg/m^3	None	Irritation	10 mg/m^3	None	250 mg/m^3	None	NA/NA	Inh Ing Con	In animals: ataxia; skin irrit, acne-like rash, liver damage
Trifluralin (p-Toluidine)	2 ppm	Skin; Animal Carcinogen	Anoxia, kidney	None	None	ND	7.50 eV	Na/NA	Inh Abs Ing Con	Irrit eyes, skin; derm; hemo. Methemo; cyan, nau, vomit, low BP, convuls; anemia, weak; [carc]
Warfarin	0.1 mg/m^3	None	Blood; bleeding	None	0.1 mg/m^3	100 mg/m^3	None	NA/NA	Inh Abs Ing Con	Hema, backpain; hematoma arms, legs; epis, bleeding lips, muc memb hemorr, abdom pain, vomit, fecal blood; petechial rash; abnor hematologic indices

ACGIH	American Conference of Governmental Industrial Hygienists	ND	None determined	ppm	Parts per million
IDLH	Immediately dangerous to life and health	NE	None established	STEL	Short-term exposure limit
IP	Ionization potential	NIOSH	National Institute of Occupational Safety and Health	TLV	ACGIH Threshold Limit Values
LEL	Lower explosive limit	OSHA	Occupational Safety and Health Administration	TPH	Total petroleum hydrocarbons
mg/m^3	Milligrams per cubic meter	PAH	Polyaromatic hydrocarbon	TWA	Time weighted average
NA	Not applicable	PEL	OSHA Permissible Exposure Limit	UEL	Upper explosive limit

Sources: The above information was derived from NIOSH Pocket Guide to Chemical Hazards, (June 1997). ACGIH Threshold Limit Values (2001).

Table 2 (Continued)

CHEMICAL HAZARD PROPERTIES AND EXPOSURE INFORMATION

****ROUTE/SYSTEMS ABBREVIATIONS:**

abdom=abdominal
abdom=abdominal
abnor=abnormal/abnormalities
album=albuminuria
Abs=skin absorption
anes=anesthesia
anor=anorexia
anos=anosmia (loss of the sense of smell)
appre=apprehension
arrhy=arrhythmias
asphy=asphyxia
aspir=aspiration
asphy=asphyxia
BP=blood pressure
breath=breathing
bron=bronchitis
broncopneu=bronchopneumonia
bronspas=bronchospasm
BUN=blood urea nitrogen
[carc]=carcinogen
card=cardiac
chol=cholinesterase
cirr=cirrhosis
CNS=central nervous system
Con=contact
conc=concentration
conf=confusion
conj=conjunctivitis
constip=constipation
convuls=convulsions
corn=corneal
CVS=cardiovascular system
cyan=cyanosis
decr=decrease
depres=depressant
derm=dermatitis
diarr=diarrhea
dist=disturbance
dizz=dizziness
drow=drowsiness
dysfunc=dysfunction
dysp=dyspnea
emphy=emphysema
equi=equilibrium
eosin=eosinophilia
epilep=epileptiform
epis=epistaxis (nosebleed)
eryt=erythema
euph=euphoria
fail=failure
fasc=fasciculation
FEV=forced expiratory volume
fibrl=fibrillation
ftg=fatigue
func=function
GI=gastrointestinal
gidd=giddiness
halu=hallucinations
head=headache
hema=hematuria (blood in the urine)
hemato=hematopoietic
hemog=hemoglobinuria
hemorr=hemorrhage
hyperpig=hyperpigmentation
hypox=hypoxemia (reduced oxygen in the blood)
ict=icterus
inco=incoordination
incr=increase
inebri=inebriation
inflam=inflammation
Ing=ingestion
Inh=inhalation
inj=injury
insom=insomnia
irreg=irregular
irrit=irritant
irrity=irritability
jaun=jaundice
kera=keratitis (inflammation of the cornea)
lac=lacrimation
lar=laryngeal
lass=lassitude (weakness, exhaustion)
Leth=lethargy (drowsiness or indifference)
leucyt=leukocytosis (increased blood leukocytes)
leupen=leukopenia
li-head=lightheadedness
liq=liquid
local=localized
low-wgt=weight loss
mal=malaise (vague feeling of discomfort)
malnut=malnutrition
ment=mental
methemo=methemoglobinemia
monocy-=monocytosis (increased blood monocytes)
Molt=molten
muc memb=mucous membrane
musc=muscle
narci=narcosis
nau=nausea
nec=necrosis
neph=nephritis
nerv=nervousness
numb=numbness
opac=opacity
palp=palpitations
para=paralysis
pares=paresthesia
perf=perforation
peri neur = peripheral neuropathy
periob=periorbital (situated around the eye)
phar=pharyngeal
photo=photophobia (abnormal visual intolerance to light)
pig=pigmentation
pneu=pneumonia
pneuitis=pneumonitis
PNS=peripheral nervous system
polneur=polyneuropathy
prot=proteinuria
pulm=pulmonary
RBC=red blood cell
Repro=repoductive
resp=respiratory
restless=restlessness
retster=retrosternal (occurring behind the sternum)
rhin=rhinorrhea (discharge of thin nasal mucus)
salv=salivation
sens=sensitization
sez=seizure
short=shortness
sneez=sneezing
sol=solid
soln=solution
som=somnolence (sleepiness unnatural)
subs=substernal (occurring beneath the sternum)
sweat=sweating
swell=swelling
sys=system

Table 2 (Continued)

CHEMICAL HAZARD PROPERTIES AND EXPOSURE INFORMATION

tacar=tachycardia
tend=tenderness
terato=teratogenic
throb=throbbing
tight=tightness
trachbronc=tracheobronchitis
twitch=twitching
uncon=unconsciousness
vap=vapor
venfib=ventricular fibrillation
verti=vertigo (an illusion of movement)
vesic=vesiculation
vis dist=visual disturbance
vomit=vomiting
weak=weakness
wheez=wheezing

- ACGIH TLVs and OSHA PELs are TWA concentrations that must not be exceeded during any 8-hour shift or a 40-hour workweek.
- Ceiling concentrations must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure.
- IDLH represents the maximum concentration from which, in the event of respiratory failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (e.g., severe irritation) or irreversible health effects.
- Skin designates the potential for dermal absorption; skin exposure should be prevented. The value only represents inhalation hazards.
- "Ppm" is parts per million by volume and is not equivalent to a ppm by weight in soil value, e.g., mg/kg.
- IPs (given in electron volt [ev] units) are presented for photoionization (PID) usefulness evaluation. The PID lamp should have an eV value greater than the analyte it is detecting.

† Exceeds PID detection capabilities.

2.2 HAZARD COMMUNICATION

In addition to the contaminants of concern, the following hazardous substance is anticipated to be brought on the site to supplement investigation activities:

- Isopropyl alcohol (IPA)
- Others _____

This hazardous material is subject to the Hazard Communication Standard (29 CFR 1910.1200); required MSDSs are presented in Appendix 1. The hazardous material must also be properly labeled with the identity of the hazardous chemical(s) contained therein and the appropriate hazardous warning information. The above list must be updated by the SHSC and MSDSs must be obtained and filed for any additional hazardous substances brought on-site. For more information, see the Health, Safety and Emergency Response Standard Operating Procedures (SOPs), Hazard Communication Written Program, in Volume VI of the Corporate SHE Manual.

The SHSC must give all site employees a hazard communication orientation about hazardous chemicals brought on-site. This briefing will include health and physical hazards, precautionary measures to be taken during normal operations and foreseeable emergencies, labeling practices, and location of MSDSs.

The FM shall ask the client for copies of MSDSs for any hazardous materials in use by the client's employers at the site. The SHSC shall orient AMEC employees/subcontractors as described above.

2.3 PHYSICAL OR OPERATING HAZARDS AND CONTROL MEASURES

Physical or operating hazards identified or reasonably anticipated to be associated with site work tasks are provided in Table 3, along with a summary of specific control measures. More detailed discussions are provided in the Health, Safety, and Emergency Response SOPs in Volume VI of the Corporate SHE Manual. All of these reference documents will remain on the site in the custody of the SHSC.

Table 3
PHYSICAL AND OPERATING HAZARDS

Hazards	Preventative measures
Back injuries due to improper lifting	Use proper lifting techniques. Lift with the legs, not the back. Keep loads close to the body and avoid twisting. Loads heavier than 50 pounds (lbs) require a second person or mechanical device for lifting. Use mechanical devices such as drum dollies, hand trucks, and tool hoists (for lifting augers) to lift or move heavy loads whenever possible.
Biological agents **References:** Emergency Response SOP ER-1, Bloodborne Pathogen Exposure Control, Poison Ivy, Oak, and Sumac Field Guide	Project work will not expose workers to infectious agents or wastes; however, responders to first aid incidents could contact bloodborne pathogens. Follow the Bloodborne Pathogen Control Plan in this Health and Safety Plan (HSP). Identify personnel who are highly sensitive or allergic to insect bites or stings during the "kickoff" meeting so that the appropriate emergency treatment can be made available on-site. Never try to capture wild or semi-wild animals—they may bite you or infect you with parasites.

Table 3 (Continued)
PHYSICAL AND OPERATING HAZARDS

Hazards	Preventative measures
Ergonomic Stress	Lift carefully with load close to body with the legs taking most of the weight. Get help with lifts greater than 40 lbs. When working with a heavy tool or object, keep legs under the load and do not overreach or twist to the side. Reposition body to be more square to the load and work. Push loads, rather than pull, whenever feasible. Do not persist with lifting when the load is too heavy. Use a mechanical lifting aid or have a coworker assist with the lift. Rotate repetitive tasks to avoid soft-tissue fatigue.
Heat stress **References:** Health SOP H-9, Heat Stress Control	When workers are wearing impervious or protective clothing, follow the National Institute for Occupational Safety and Health/OSHA/U.S. Coast Guard/U.S. Environmental Protection Agency protocol for the prevention of heat stress. Monitor for heat stress at temperatures greater than 70°F. Train workers to recognize the signs and symptoms of heat illnesses: • Heat cramps—muscle spasms during or after work shift • Heat exhaustion—fatigue, clammy skin, nausea, profuse sweating • Heat stroke—confusion, hot and dry skin, absence of sweating (life threatening) First Aid • Perform emergency decontamination. • Remove victim to cool area. • Give cool fluids (only if conscious). • Immediately reduce body temperature. • Seek medical attention. Prevention • Provide shelter or shaded area for work tasks (as feasible) and break areas. • Adjust work schedules by rotation of personnel or alternate job functions to minimize heat stress or overexertion at one task. • Work during cooler hours of the day (or night), as feasible. • To maintain normal body fluid levels, drink 16 ounces (oz) (2 cups) of water before each shift and about 8 oz (1 cup) every 15 to 20 minutes. Drink 2 gallons of water during an 8-hour period. • Wear nonbinding cotton clothing (e.g., medical scrubs and cotton undergarments) under personal protective equipment (PPE) to absorb moisture and to help prevent heat rash. Where feasible, set up field "showers" or hose-down areas to cool down body.

Table 3 (Continued)
PHYSICAL AND OPERATING HAZARDS

Hazards	Preventative measures
Inclement weather, shut-down conditions **References:** Emergency Response SOP ER-2, Emergency Action Plan for Field Operations	Poor visibility. Precipitation severe enough to impair safe movement or travel. Lightning in the immediate area. Steady winds in excess of 40 mph. Other conditions as determined by the SHSC, FM, or Corporate Safety, Health, and Environment Director (Corporate SHE Director). Imminent threat of severe tropical storm or hurricane. (Also see Emergency Response section of this HSP and Emergency Action Plan SOP ER-2.) Work will resume when the conditions are deemed safe by the SHSC. Complete an Incident Report (Appendix 2) within 24 hrs for all work shutdowns.
Slips, trips, and falls **References:** Safety SOP S-11, Signs, Signals, and Barricades; Administrative SOP A-2, Housekeeping	Clear work area of obstructions and debris before setting up. Alter work areas as necessary to provide a safe, reasonably level area. All walking and working surfaces shall continually be inspected and maintained to be free of slip, trip, and fall hazards. Keep drill platforms, stairs, and immediate work areas clear. Do not allow oil, grease, or excessive mud to accumulate in these areas. Channel the discharge of drilling fluids and foam away from the work area to prevent ponding or slippery conditions. Backfill open boreholes immediately, or cap and flag them. Barricade open excavations or cover them with steel traffic plates. Eliminate slip, trip, and fall hazards or identify them clearly with caution tape, barricades, or equivalent means. Store loose or light material and debris in designated areas or containers. Secure tools, materials, and equipment subject to displacement or falling.
Ultraviolet Exposure	Wear appropriate clothing (long pants, shirt or tee shirt) and a hat to protect skin from prolonged sun exposure. Apply sunscreen (Sun Protection Factor [SPF]>15) prior to working outdoors in the sun and periodically thereafter. Wear polycarbonate safety glasses to protect eyes from ultraviolet exposure. Use lip balm with SPF 15 or greater. Reduce sun exposure from 10 AM to 4 PM. Utilize shade protection especially during these hours.

2.4 HAZARD ANALYSIS OF EACH SITE WORK TASK *(List for Each Task in SOW)*

TASK NAME: SOIL SAMPLE COLLECTION

Equipment/tools: disposable stainless trowel

Hazardous chemicals: PESTICIDES (ORGANOCHLORINE, CARBAMATE, AND UREA), HERBICIDES (CHLORINATED, ORGANOPHOSPHORUS, AND TRIAZINE), ARSENIC, LEAD, CADMIUM, MERCURY

Potential hazards: Check or add all that apply to site conditions		
(X) Ground intrusion (underline)	(X) Chemical (underline)	(X) Biological (underline)
Drilling Sampling	Vapor generation	Toxic or irritant plants
Excavation Direct push	Dust generation	Pathogens Insects
( ) Heavy equip. operation	Mat'l contact	( ) Fire/explosion (underline)
(X) Physical exertion/strain	( ) Electrical (underline)	Flammable materials
( ) Slick/wet surfaces	Ovrhd./underg. utilities	Fuel lines
( ) Uneven terrain	Energized equipment	Hot work
( ) Falls from elev. >6 ft	Power tools	Compressed gases
( ) Trench collapse/engulf.	( ) Pedestrian traffic	( ) Boat operation/usage
( ) Confined space/O_2 def.	( ) Vehicle traffic	( ) Work over water
(X) Heat stress	( ) Noise (>85 dBA)	( ) Explosive ordnance
( ) Cold stress	(X) Ergonomic (lifting, repetitive motion)	( ) Other: UV Exposure

Control and protective measures: Identify and reference location of control measures for each hazard listed above (Corporate SHE Manual, SOPs, Standard Safe Work Practices, etc.).

( ) Equip. Operator Training ( ) Equip. Certific./Inspections (X) PPE Level Level C

( ) Air Monitoring Equipment: _____

(X) Specialized Training: HAZWOPER

(X) Site Control/Safe Access: Clearly delineate exclusion zone with cones and caution tape

(X) SOPs/Guidelines: Heat Stress Control (H-9), Respiratory Protection (H-13)

( ) Engineering Controls: _____

(X) Safe Work Practices: See section 3.1.4 and Appendix 3 for SOPs

(X) Other: Maintain supply of water and drink atleast 1 cup per hour for heat stress. Wear sunscreen and hat for UV protection. Sediment sampling will not occur if preceded by or during heavy rain events.

Personal Protective Equipment (PPE)

Initial levels of protection were assigned to this work task based on the potential risk of exposure. These levels may be changed if warranted by monitoring data (see Action Levels) and site conditions (as determined by the SHSC). Any change to these initial levels must be noted here and documented with a completed ROC form (Appendix 2).

EPA level of protection	( ) A ( ) D Modified	( ) B ( ) D	(X) C
Respirator (Level C and up)	( ) SCBA, airline ( ) P-100 Filter	(X) purif. resp. ( ) dust pre-filters	( ) OV/AG cart ( ) other OV/P-100
Protective clothing	( ) encap. suit ( ) Saranex ® or equiv.	(X) Tyvek ® or equiv. ( ) splash suit	( ) PE Tyvek ® or equiv. (X) other OV/P-100
Head, face, eyes, ears	( ) hard hat ( ) splash shield	(X) safety glasses ( ) ear plugs/muffs	( ) goggles ( ) other
Gloves (outer) (inner)	(X) nitrile (X) nitrile N-dex	( ) neoprene ( ) vinyl	( ) other ( ) other
Footwear	(X) safety-toe leather ( ) hip waders	(X) overboots/covers ( ) shin/knee guards	(*) safety-toe rubber ( ) other

Modifications: * Safety-toe rubber boots maybe substituted for safety-toe leather boots/covers

X = required PPE; * = modifications permitted; † =in case of upgrade.

3.0 PERSONNEL PROTECTION

The prescribed methods and procedures used to protect personnel (site workers and adjacent community) from overexposure to hazardous materials and hazardous conditions posed by site operations are grouped into three primary categories: Administrative Controls, Engineering Controls, and PPE.

3.1 ADMINISTRATIVE CONTROLS

3.1.1 Medical Surveillance

Periodic Comprehensive Exam:

All personnel requiring access to controlled work areas will have completed a preassignment medical examination and a periodic (usually annual) update examination prior to assignment, in accordance with OSHA 29 CFR 1910.120(f). The exam must be performed by an Occupational Health Physician, who will provide written clearance for hazardous waste site work and for respirator usage. Protocols for the baseline, periodic, and exit exams must be at least as stringent as those defined in the AMEC Medical Surveillance Program, Volume III of the Corporate SHE Manual.

Emergency Medical Treatment:

Personnel who exhibit signs and symptoms of chemical or heat overexposure, or have been injured on the job, might also seek medical services. See also the Medical Emergency Response (Section 9.3) for specific information regarding emergency services and logs, reports, and record keeping, and Section 3.1.5 for required report submittals. Subcontractors should provide internal Workers' Compensation information to the SHSC during the prework meeting, for emergency use.

Medical Clearance Record Keeping:

AMEC employees shall carry wallet cards documenting medical clearance. The actual clearance documents are on file at the home AMEC office or in the San Diego Corporate Health and Safety Department. To ensure confidentiality, results of the medical exams or treatment records are maintained at the Medical Care Provider's clinical offices.

3.1.2 Training

Comprehensive:

All routine on-site general site workers performing intrusive activity or having the potential to receive exposures exceeding permissible limits will have completed the OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) Training. Three days of on-site supervised training must be completed upon initial assignment. Appropriate annual refresher (within 12 months) updates must be completed by all HAZWOPER personnel. Supervisors will have completed the above and an additional 8 hours of OSHA Management and Supervisory Training.

Occasional site workers who are not expected to receive exposures exceeding permissible exposure limits (e.g., geophysical and land surveyors) require only 24 hours of OSHA HAZWOPER Training and 1 day of on-site training and supervision.

First Aid/CPR Instruction:

All AMEC staff will have completed training in first aid/cardiopulmonary resuscitation (CPR) and fire extinguisher usage.

Specialized:

Prior to initiation of site activities, the SHSC and PM/FM will conduct a health and safety "kickoff" meeting. At this meeting, pertinent AMEC SOPs and the site-specific HSP will be discussed in detail with special attention given to site chemical and physical hazards, PPE, emergency procedures, etc. Upon completion of this briefing, all routine field personnel, including subcontractors, will be required to read and sign the acceptance sheet of this HSP.

Site visitors and nonroutine subcontractors who do not attend this meeting will be required to undergo a specialized health and safety orientation, as documented on the Site Visitor and the Subcontractor Health and Safety Orientation Forms in Appendix 2.

Daily:

"Tailgate" safety meetings will be conducted each morning by the PM/FM, SHSC, or a rotation of AMEC and subcontractor team members for all phases of work. The tailgate meetings will be conducted in accordance with SOP A-9, Guidance for Conducting Tail-gate

Safety Meetings (Appendix 3). Topics of discussion will include work tasks and designated PPE, emergency procedures, evacuation routes, instruction in use of safety equipment (as required), prior safety problems, recognition of signs and symptoms of overexposure, importance of proper decontamination, and personal hygiene, etc. These meetings must be documented; forms are provided in Appendix 2.

Fire Extinguisher Usage:

In accordance with 29 CFR 1910.157, all field personnel who are provided portable fire extinguishers for use will be familiar with general principles of use and the hazards of incipient (early stage) firefighting.

DOT Hazardous Materials Shipment/Receipt (HM 126F):

In accordance with 49 CFR 172, Department of Transportation (DOT) HM126F training is required for all employees who handle, transport, or prepare to transport hazardous materials.

Equipment Operators:

In accordance with state and federal OSHA regulations, all heavy equipment operators (forklifts, backhoe, excavators) must be trained for safe operation. Proof of documentation may be requested.

3.1.3 Accident Prevention

The SHSC as well as all site employees will inspect the work site daily to identify and correct any unsafe conditions.

Adherence to the Safe Work Practices (to follow) and procedures outlined in this HSP will assist with accident prevention.

3.1.4 Safe Work Practices (see also Appendix 3 for SOPs):

Personal Conduct

- Unauthorized personnel are not allowed on-site, particularly in the Exclusion Zone (EZ).

- Work groups will always consist of at least two team members.
- A high standard of personal hygiene will be observed. Smoking, eating, drinking, chewing gum or tobacco, taking medication, and applying cosmetics will not be permitted within any restricted area or EZ.
- Wearing of contact lenses in contaminated atmospheres is prohibited unless a full-face respirator is worn.
- Personnel under the obvious influence of alcohol or controlled substances are not allowed on-site; those taking medications must notify the SHSC.
- All site personnel will familiarize themselves with these practices and the emergency procedures during daily tailgate and prework safety meetings.
- Workers who are passengers or drivers of vehicles (both off-site and on-site) will wear their seat belts any time the vehicle is in motion.

Personal Protection

- Personnel will avoid skin contact with contaminated or potentially contaminated media. If such contact occurs, the affected areas should be washed thoroughly with soap and water.
- Personnel will discard and replace any damaged or heavily soiled protective clothing. Discarded PPE will be drummed at the end of each day.
- Personnel should notify the SHSC of any defective monitoring, emergency, or other protective/safety equipment.
- A supply of potable water, electrolyte replacement solutions, shaded break area, and sufficient lighting will be maintained on-site; sanitary facilities will be accessible to personnel.
- Wind-flags will be positioned on-site so that work can be performed upwind as much as possible.

Equipment and Activities

- Open flames are not allowed anywhere on-site without a hot-work permit.
- Owners/operators of heavy equipment will ensure that the equipment is in good working order by performing daily inspections and routine maintenance. Deficiencies affecting health and safety shall be corrected prior to equipment use.

- All unsafe conditions shall be made safe immediately. All unsafe conditions not in the scope of the project shall be reported to the PM/FM and the condition corrected.
- Loose-fitting clothing or loose long hair are prohibited near moving machinery.
- All internal combustion engines must have spark arrestors that meet the requirements for hazardous atmospheres if they are to be used in such areas.
- Do not fuel engines while vehicle is running.
- Install adequate on-site roads, signs, lights, and devices.
- Where portable electric tools and appliances can be used (where there is no potential for flammable or explosive conditions), they will be equipped only with 3-wire grounded power and extension cords to prevent electrical shock.
- Store tools in clean, secure areas so they will not be damaged, lost, or stolen.
- When exiting a vehicle, shift into park, set the parking brake, and shut off the engine. Never leave a running vehicle UNATTENDED.

3.1.5 Logs, Reports, and Record Keeping

Submittal of Certifications:

Proof of health and safety training and medical certifications must be submitted to the PM or FM and SHSC by the subcontractor prior to mobilization of field crews. The SHSC will maintain a copy of the certifications (and all ROCs for revisions of personnel additions and substitutions) certifying that all AMEC and subcontracted personnel have satisfied the minimum training and medical requirements listed above. Supporting documentation and certificates will remain on file with the SHE Coordinator in the home office. Field projects will not be allowed to take place in the absence of adequate documentation.

Site Monitoring, Reports, and Records:

The health and safety field files maintained by the SHSC, or his/her designee, will be the primary form of record keeping and documentation of site health and safety activities. These documents will be completed in sufficient detail to document the work performed; any unusual or significant circumstances under which the work was performed; any unanticipated/unplanned action taken to mitigate or to otherwise cope with unexpected field conditions; and pertinent comments about site-specific conditions that could have a bearing on the work performed. Documentation is required for all phases of work. See also the SHSC duties listed under Section 1.6, Personnel Responsibilities. Record keeping practices will follow 29 CFR 1910.20.

The health and safety records will contain the following documents; all blank forms (designated by an asterisk) are provided in Appendix 2 to this HSP:

- certification of medical and training requirements
- signed acceptance sheet of this HSP (signed by all routine on-site personnel)
- safety inspection records, including violations and remedial action plans
- health and safety notations made in the Site Log Book that is held by the PM or FM
- OSHA Form No. 200
  * Employee/Visitor Daily Roster
  * Visitor Health and Safety Orientation Form
  * Subcontractor Health and Safety Orientation Form
  * AMEC Tailgate Safety Meeting Report
  * Instrument Calibration Log
  * ~~Machinery & Mechanized Equipment Certification Form~~
  * ~~Daily Drill Rig Checklist~~
  * ~~Daily Backhoe Checklist~~
  * ~~Confined Space Entry Permit~~
  * ~~Hot Work Permit~~
  * Site Air Surveillance Record
  * Workplace Exposure Sampling Record
  * Supervisor's Report of Injury or Illness and First Aid Incident Report
  * Accident/First Aid Incident Summary Log
  * Hepatitis B (HBV) Vaccination Declination
  * Incident Report (for environmental incidents, equipment damage, and work stoppages)
  * completed ROCs to this HSP
  * SHSC Biweekly Report (submit for field projects lasting longer than 2 weeks)

3.2 ENGINEERING CONTROLS

3.2.1 Barriers

Barriers and Signs:

Barricades, traffic cones, and/or marking or caution tape will be erected at a safe distance from excavations, pits, hazardous areas, and moving equipment to prevent unauthorized access to work areas from vehicular and pedestrian traffic. Barriers will be appropriate for the level of work activities and anticipated traffic.

3.2.2 Containments

All sampling equipment will be disposable and no containment will be necessary.

3.2.3 Ventilation

No specialized ventilation equipment will be utilized on this project.

3.2.4 Dust Suppression

When necessary, dust suppression techniques will be employed to minimize the generation of dust/particulates and associated contaminants into the atmosphere, to the greatest extent possible. The water tap should be fitted with a nozzle or other device to create a water spray or curtain to contain dusts. Also, stationary sources of dusts, e.g., stockpiles, should be covered with plastic (visqueen) or canvas tarping.

3.2.5 Rinsate Collection/Containment

All sampling equipment will be disposable and no containment will be necessary.

3.2.6 Noise Reduction

Site activities in proximity to welding, construction, and heavy equipment often expose workers to excessive noise. It is not anticipated that situations may arise when noise levels

may exceed the OSHA Action Level of 85 decibels (A-weighted scale) (dBA) in an 8-hour time-weighted average (TWA). If excessive noise levels occur, ear plugs will be issued to all personnel and a system of hand signals understood by all will be implemented (see Section 4.4).

3.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

3.3.1 Levels of Protection

Initial levels of protection for this site may vary depending on the task. All personnel entering controlled work zones will initially be required to wear the U.S. Environmental Protection Agency (EPA)/OSHA Level of Protection as specified in Section 2.4, Hazard Analysis of Each Site Work Task, and summarized in Table 4 below.

Table 4

INITIAL ASSIGNMENTS OF PROTECTION LEVELS, TRAINING, AND MEDICAL SURVEILLANCE FOR SITE WORK TASKS

Task Name *List in same order as in Section 2.4, Hazard Analysis of Each Site Work Task*	Level of Protection *	HAZWOPER		
		40-hour Classroom Training	24-hour Classroom Training	Medical Surveillance
Soil Sample Collection	C	X		X

* Initial assignments may be modified by the SHSC as additional data are received from monitoring data and compared to action levels (Table 5), or as warranted by site conditions. Any changes will be noted in this HSP and/or documented on ROCs (Appendix 2).

Refer to SOP H-12, Personal Protective Equipment, in Volume VI of the Corporate SHE Manual for levels of protection definitions and examples.

Protection may be upgraded or downgraded depending on monitoring data (compared with action levels) and site conditions, as determined by the SHSC. All changes must be noted in this HSP and documented on ROCs (Appendix 2). The following outlines the minimum requirements for each level of protection that is assigned or potentially assigned.

Level D PPE:

- Work shirt and full-length cotton pants or coveralls
- American National Standards Institute (ANSI) standard safety-toe work boots
- ANSI standard hard hat (when working around heavy equipment or overhead "bump" hazards)
- ANSI standard safety glasses
- EPA-approved hearing protectors (when working in high noise areas, e.g., steam cleaners and heavy equipment)

Modified Level D PPE:

- Level D equipment
- Tyvek® coverall or equivalent (upgrade to polyethylene [PE] or Saranex-coated Tyvek® as needed)
- Outer chemical-resistant gloves and inner nitrile gloves
- Boot covers or chemical-resistant boots

Level C PPE:

- Modified Level D equipment, with taping of coverall to boots and gloves, as necessary
- National Institute of Occupational Safety and Health (NIOSH)-approved, half-face or full-face air-purifying respirator with organic vapor/acid gas cartridges and particulate prefilters (respirator usage clearance is defined in SOP H-13, Respiratory Protection, Volume VI of the Corporate SHE Manual)

Level B PPE:

- Modified Level D equipment, use of chemical-resistant coverall, taped to boots and gloves
- NIOSH-approved, pressure-demand, full-facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied-air respirator with escape-SCBA (additional employee training is required for Level B operations)

Level A PPE:

- Level B equipment, use of fully encapsulating suit

3.3.2 Chemical Cartridge Change Out Schedule

Based upon OSHA requirements and manufacturer recommendations, organic vapor cartridges used with the air purifying respirator will be changed out daily whenever the level of PPE is increased to Level C or when Level C is initially required. The used cartridges will be disposed of as part of the project IDW.

3.3.3 PPE Donning/Doffing Procedure

The following procedures are given as a guide; failure to adhere to these procedures may result in the PPE being ineffective against contaminants. These procedures may be altered by the SHSC if improvements can be made and these changes are warranted in the field. Also, some articles of PPE may not be necessary for all site tasks.

PPE Donning Procedure (for Mod. Level D and greater):

- Inspect all protective gear before donning.
- Don Tyvek® coverall or equivalent, inner gloves and outer gloves, secure with tape, as required, leave pull tab. If coverall is loose secure with tape to avoid capture in moving or rotating equipment.
- Don respirator. If not in Level C, maintain respirator in a sealed plastic bag on-site in case of an upgrade.

PPE Doffing Procedure (see also SOP H-6, Personnel Decontamination, Volume VI, Corporate SHE Manual):

- Wash/rinse (if necessary) excess mud or other debris from outer boots, gloves, and clothing.
- Remove tape using pull tab and remove outer clothing in the order of boots, outer gloves, and coverall suits. Place disposable and reusable PPE in designated (separate) containers.
- Remove respirator (if applicable). Decontaminate and fit-check prior to reuse.
- Remove inner gloves.
- Wash face, neck and hands.
- Enter the Support Zone (SZ).

3.3.4 PPE Failure/Chemical Exposure

In the event of PPE failure, worker and buddy will cease work, perform personal decontamination procedures, and exit to the SZ. Refer to the MSDS and Section 9.0, Emergency Actions, if emergency medical response is needed. If chemicals contact the eyes, irrigate for 15 minutes and consult a physician.

3.3.5 PPE Inspection, Storage, and Maintenance

Reusable PPE will be decontaminated, inspected, and maintained, as necessary, after each use. Personal equipment (e.g., respirators, leather safety-toe boots) shall be properly stored by the employee/subcontractor.

The SHSC will periodically inventory the disposable and reusable PPE on-site and will replenish stocks in a timely manner.

4.0 SITE CONTROL

4.1 SITE SECURITY

Access will be limited to all controlled areas via the prescribed administrative (certifications) and engineering (barricades) controls. All site staff and visitors will note arrival and departure times on the Employee/Visitor Daily Roster (Appendix 2). All equipment, tools, and property shall be secured at the end of each day.

4.2 VISITOR ACCESS

All site visitors (except OSHA inspectors) must receive prior approval from the FM, PM, and client, and may do so only for the purposes of observing site conditions or operations. Upon arrival, visitors will report to the SHSC to receive and sign the Site Visitor Health and Safety Orientation Form (Appendix 2). All visitors, regardless of their rank or professional level, will not be allowed into controlled work areas unless training and medical requirements have been met and documented.

4.3 WORK ZONES

Sampling procedures will be rapidly executed across a very large site, formal work zones will not be designated. A large portion of the site is heavily vegetated and remote. Very little to no pedestrian or vehicular traffic is anticipated.

4.4 COMMUNICATIONS

The "buddy system" will be enforced for field activities involving potential exposure to hazardous or toxic materials, and during any work within the EZ. Each person will observe his/her buddy for symptoms of chemical or heat overexposure and will provide first aid or emergency assistance when warranted. A mobile phone will be maintained on-site for emergency use.

The following emergency hand signals will be used:

Thumbs up	=	OK; understand
Thumbs down	=	No; negative
Grasping buddy's wrist	=	Leave site now
Hands on top of head	=	Need assistance
Horn - one long blast	=	Evacuate site
Horn - two short blasts	=	All clear, return to site

5.0 AIR SURVEILLANCE

5.1 TYPE AND FREQUENCY OF MONITORING

TYPE	MINIMUM RECOMMENDED FREQUENCY
Background:	Once per day in the work area and perimeter using direct-reading instruments, prior to any intrusive activities or equipment startup.
Perimeter:	Once per hour using direct-reading instruments during intrusive activities.
Personnel:	At least twice per day in the breathing zone of those with the highest anticipated exposure during intrusive activities.
Area:	At least twice per day in each work zone and at the onset of any new intrusive activities, or at new locations.
Environmental:	Periodic field screening of selected samples per the Sampling and Analysis Plan.

5.2 MONITORING INSTRUMENTS

The SHSC will maintain equipment SOPs (Appendix 3) or instrument manuals on-site that specify calibration, general use, and troubleshooting procedures. All monitoring equipment will be field calibrated on a daily basis according to the manufacturer's instructions and will be recorded on the Instrument Calibration Log (Appendix 2).

EQUIPMENT	CONTAMINANT	WORK ACTIVITY
Mini Ram	Particulates	Soil Sampling

5.3 ACTION LEVELS

Action levels should be established for upgrading/downgrading PPE, work stoppages, and evacuation (see Appendix 4 for Justification of Action Levels calculations). The decision to upgrade/downgrade the level of PPE must be based upon instrument readings measured in the breathing zone of site personnel and comparison of the results to the information contained in Table 5. Record readings on Site Air Surveillance Record forms (Appendix 2).

Table 5
ACTION LEVELS

EQUIPMENT	ACTION LEVEL	ACTION TO BE TAKEN
Mini Ram	< 4 mg/m^3 for 5 min in breathing zone (BZ)	Downgrade to Mod D
	≥ 4 mg/m^3 for 5 min in BZ	Upgrade or maintain Level C PPE w/ respirator (OV/P-100)

6.0 DECONTAMINATION PROCEDURES

Procedures for the decontamination of sampling tools and other related equipment are specified in the sampling plan. Note that separate areas should be established for personnel, sampling, and heavy equipment decontamination; see also Engineering Controls, Section 3.2, of this HSP and SOP H-5, Sampling Equipment, Heavy Equipment, and Vehicle Decontamination, and SOP H-6, Personnel Decontamination (Appendix 3).

6.1 PERSONNEL DECONTAMINATION

EQUIPMENT	DECONTAMINATION SOLUTION	PROCEDURES
		Final
Garbage bags Paper towels Duct tape	Tap water for rinsing	Segregate equipment drop. Remove and dispose of boot covers. Remove and dispose outer gloves. Remove and dispose of Remove and dispose of coverall. Remove and dispose of inner gloves in designated receptacle. Field wash for personal hygiene. Exit to Support Zone.
Note: Decontamination is performed before lunch, when taking cool down breaks, and when exiting the site. Outer gloves are changed between sampling locations		

6.2 EQUIPMENT DECONTAMINATION

All equipment that will potentially contact samples will be disposable and discarded after a single use.

6.3 EMERGENCY DECONTAMINATION

In the event of an accident or incident where work must cease and staff must exit the EZ, emergency decontamination should be performed to the greatest extent feasible. In an emergency, the primary concern is to prevent the loss of life or severe injury. If immediate medical attention is required to save a life, decontamination should be delayed until the victim is stabilized. If the decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an

extremely toxic or corrosive material that could cause severe illness or loss of life, decontamination must be performed immediately. If an emergency due to a heat-related illness develops, protective equipment should be removed carefully from the victim as soon as possible.

Any time emergency decontamination methods must be used, an Incident Report or Supervisor's Report of Injury or Illness (Appendix 2) must be completed by the SHSC and submitted to the Corporate SHE Director.

6.4 DISPOSAL PROCEDURES

Used disposable sampling equipment and PPE will be considered non-hazardous and suitable for disposal with other municipal waste generated on the island of Kauai.

7.0 SANITATION AND ILLUMINATION

7.1 SANITATION

Potable drinking water shall be supplied in tightly closed containers and shall be clearly marked for its intended use. If vehicles are available for use by field crews, restrooms and a field washing area with potable water will be available within a reasonable distance from the site. If such facilities are not located within a reasonable distance, portable facilities will be installed for use by field employees. If the nature of the project is mobile and of a duration less than 6 months, no permanent on-site shower/change facility will be provided.

7.2 ILLUMINATION

It is anticipated that all site work will be conducted during daylight hours. If circumstances arise in which field work is to be conducted before or after daylight, or sunlight is obstructed, illumination within all general site areas will be maintained at or above 5 foot-candles for general site areas.

8.0 SPILL PREVENTION

Hazardous chemicals brought on-site will be limited in quantity and properly contained. No flammable liquids are anticipated to be brought onsite.

9.0 EMERGENCY ACTIONS

9.1 PREPLANNING AND GENERAL PROCEDURES

General Emergency Information:

Site personnel should be constantly alert to recognize potentially unsafe work practices, hazardous work environments, and IDLH conditions, and they should be routinely reminded of signs and symptoms of chemical and heat overexposure. Emergency response procedures (this section) should be reviewed daily and updated, as necessary, following incidents. Prearrange access for emergency crews when necessary.

In the event of a large-scale spill, fire/explosion, or major emergency, the FM is expected to notify the PM; the PM notifies the client, evacuates the area, and lets appropriately trained emergency staff respond to the situation. The safety and well-being of site personnel, visitors, and the adjacent community will be of utmost importance in determining the appropriate response to a given emergency. An Employee Emergency Action and Fire Prevention Plan (Volume V of the Corporate SHE Manual) has been prepared in accordance with OSHA 29 CFR 1910.38; annual training is required for all AMEC personnel.

Emergency Coordinator (EC):

The PM or FM will serve as the EC during an actual emergency response situation. The PM or FM will serve as the primary EC at all times; first aid and rescue duties are shared between the first aid/CPR trained team members. All foreseeable first aid and rescue equipment should be stored on-site in an accessible area. The EC will contact off-site emergency response agencies and will serve as the main spokesperson when the responders arrive on-site.

Site Maps:

An updated site map (see Section 4.0, Site Control) that is used during daily tailgate meetings will be used to inform the staff of hazardous areas, zone boundaries, site terrain, evacuation routes, work crew locations, and any site changes. In the unlikely event that an emergency occurs, the problem areas will be pinpointed on the site map, and pertinent information, such as weather and wind direction, temperature, and forecast, will be added as obtained. This map will be provided to the responding agencies.

Emergency Decontamination:

For first aid of non-life-threatening injuries, evacuate to decontamination line and decontaminate as much as possible or practical; contaminated clothing should be removed. For life-threatening injuries/exposures, field decontaminate as much as possible for the person's own safety, wrap in a blanket or polyethylene sheeting, and immediately transport to the designated medical facility. Also, phone ahead and bring this HSP for informational purposes and MSDS access by medical staff.

Safe Refuge Area:

To be determined; this will be discussed in the tailgate meetings by the ECs daily, once on-site. It will be set up in the SZ or at an off-site location in the event of a sitewide evacuation. This area will be upwind, and the location and escape routes will be designated on site control maps. It will contain emergency equipment, escape route maps, communications, and the Emergency Reference (call) List. This is required for all phases of work. In an emergency, the EC (PM or FM) will take a "head count" against the Employee/Visitor Daily Roster (Appendix 2), initiate search/account for missing persons, notify the emergency crews (as applicable), and limit access into the hazardous emergency area to necessary rescue and response personnel in order to prevent additional injuries and possible exposures.

Emergency Equipment:

Emergency equipment will be maintained in field vehicle (V), in the Support Zone (SZ), except for * items that will be kept in the Exclusion Zone (EZ) and as applicable in the field trailer (FT). All items must be checked and maintained by the SHSC at least weekly and after each use.

(X) First Aid Kit, V/FT	( ) Fire Extinguisher, V/EZ	( ) Field Showers, FT or V
( ) SCBA, V/FT	( ) Escape Packs	(X) Alarms*, V/EZ
( ) Spill Equipment, V	(X) Mobile or Cellular Phone, V/FT	( ) Fire Blanket*, V/EZ
( ) Other	(X) Hospital Route Map, V/FT	

Evacuation Procedures:

Expeditious evacuation routes to the Safe Refuge Area(s) will be established daily for all work area locations, with respect to the wind direction. Evacuation notification will be a

continuous blast on a canned siren, vehicle horn, or direct verbal communication. Emergency drills should be performed periodically. Any additions to evacuation procedures require an update to this HSP.

In the unlikely event that an evacuation is necessary, all personnel will immediately proceed to the predetermined Safe Refuge Area, decontaminating to the extent possible for personal safety, based on the emergency. The EC should then begin the site security and control measures.

9.2 SITE-SPECIFIC RESPONSE SCENARIOS

9.2.1 Natural Disasters

Earthquake, storm, flood

Alarm: Verbal or vehicle horn

Action: Evacuate to designated Safe Meeting Area. FM/EC will determine.

9.2.2 Weather-related Emergencies

All work will cease should any of the following weather conditions arise:

- Poor visibility
- Precipitation severe enough to impair safe movement/travel
- Lightning in the immediate area
- Winds in excess of 40 miles per hour
- Flooding
- Other conditions as determined by the SHSC, or PM or FM

9.2.3 Spill and/or Discharge of Hazardous Materials

Training:

Responses to incidental releases or spills of hazardous substances that can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area are not considered to be emergency responses under 29 CFR 1910.120(l) and do not require additional specialized training.

Spill Control and Response:

There is a low potential for incidental spillage/leakage of hazardous materials (fuels, grouts, detergents) that are brought on-site to implement project activities. Store these materials properly and maintain the appropriate spill response equipment in or easily accessible to the area where the materials are used/stored. In case of incidental spills or leaks, follow these steps:

1. Notify the SHSC and FM.
2. Select appropriate PPE and response equipment.
3. Contain the spill to the extent possible.
4. Neutralize or solidify the liquid per the MSDS.
5. Transfer to an IDW container.
6. Document with an Incident Report (Appendix 2).
7. Notify the Client.

Discharge Control and Response:

In the event of an uncontrollable discharge of hazardous material from an existing client structure (impoundment, tank, etc.) the EC will immediately contact the client to coordinate implementation of the client's Emergency Response Plan. If safe to do so, shut off affected lines and activate the alarm system at locations predetermined by the client. Other than to take diligent measures to prevent further discharge, AMEC personnel shall not assist in emergency response activities but will evacuate to the prearranged Safe Refuge Area(s) and implement the site security and control measures.

9.2.4 Fire or Explosion

Sound the emergency alarm (continuous blast on a canned siren, vehicle horn, or direct oral communication) to summon the EC, who will then decide whether to call the Fire Department for outside assistance (see Section 9.1, Preplanning and General Procedures). Small-scale fires (less than one-half of the responder's height) should be extinguished with an accessible ABC fire extinguisher by any team member who has received training. Fires in boreholes may be smothered with a fire blanket. Trained emergency crews will be summoned to control any large-scale or potentially unmanageable incident. Any off-site responding agencies will be briefed about site-specific hazards so they can be optimally helpful in an emergency situation. The EC will evacuate all nonresponse personnel and visitors to the Safe Refuge Area; will notify the PM, as applicable, the client, and the AMEC Corporate SHE Director (see call list); and will complete the appropriate reports.

See also Table 3 of this HSP, and the Emergency Action Plan for Field Operations, SOP ER-2 (Appendix 3).

9.3 MEDICAL EMERGENCY RESPONSE

9.3.1 Hospital

In the event of a serious injury or an accident that occurs after hours, transport the victim to the hospital emergency room listed below.

HOSPITAL NAME:	HOSPITAL ADDRESS:
Kuakini Health System	347 North Kuakini Street, Honolulu, Hawaii 96817
HOSPITAL TELEPHONE:	**DIRECTIONS:**
(808) 547-9540 Emergency *(808) 547-9156 Information*	Right on Linapuni Street, Right on North School Street, Left on Liliha Street, and Right on North Kuakini.

Hospital Route:

Refer to Figure 2, Hospital Route Map.

Site Personnel Response Actions:

Sound emergency alarm (continuous blast on a vehicle horn, or direct verbal communication) to summon the ECs who will assess the situation, taking first necessary precautions for personal safety. The ECs will determine whether to transport the injured party to the nearest hospital, or summon an ambulance by calling 911 (see Section 9.1, Preplanning and General Information). The site control measures will be implemented. Any off-site responding agencies will be given the Site Map and informed about the site-specific hazards so they can be optimally helpful in an emergency situation.

The EC will direct that the employees responding follow the Emergency Decontamination procedures described in Section 6.3 and provide first aid to the extent possible while awaiting medical attention. In emergencies, the injuries and illnesses that may arise will vary from incident to incident; check Tables 2 and 3 and the MSDSs (Appendix 1) or contact the Poison Control Center for emergency first aid procedures. Medical treatment may range from bandaging of minor cuts and abrasions to lifesaving techniques; therefore, first aid/CPR training is required for all AMEC staff. The SHSC will serve as the primary caregiver and bloodborne pathogen officer (see also Bloodborne Pathogen Exposure Control Plan below), but these duties are shared between qualified team members. It is essential that all site personnel in need of emergency care receive treatment. Appropriate documentation and notification will be discussed later in this section.

9.3.2 Bloodborne Pathogen Exposure Control Plan

The Bloodborne Pathogen Exposure Control Plan for Field Operations, located in the Health, Safety, and Emergency Response SOPs, Volume VI of the Corporate SHE Manual, provides detailed procedures for controlling exposure to bloodborne pathogens. Procedures are summarized herein.

Exposure Determination:

First aid responders have the potential to be exposed to bloodborne pathogens. The potential for exposure to bloodborne pathogens outside of emergency response is not anticipated.

Exposure Control

Universal Precautions:

Use the Center for Disease Control "Universal Precautions" as an approach to infection control, which assumes that all human blood and certain human body fluids are treated as if known to be infectious for Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and other bloodborne pathogens.

Personal Protection Equipment:

While rendering first aid where exposure to blood may occur, AMEC employees will don, at a minimum, latex or blue nitrile gloves. Gloves will be available in the field first aid kit in a packet. Other items included in the packet that are to be used to control the "spill" are absorbent beads, a plastic scooper, a biohazard bag for waste, and surface disinfecting and hand-cleaning towelettes. Other suggested PPE in the event of a serious blood-producing injury includes safety glasses, Tyvek® coveralls, boot covers, and nitrile outer gloves – all of which should be available on-site. In addition, a disposable, one-way CPR mask to prevent direct contact between the rescuer and recipient will also be available in the first aid kit should the need arise.

Personal Hygiene:

A hand-washing facility must be present in the event of bloodborne pathogen exposure. Basins, water, soap, and towels are available at all sites for this purpose.

Hepatitis B Vaccination:

First aid providers to job site injuries do not need to receive a preexposure Hepatitis B vaccine but are encouraged to do so. All first aid providers assisting in any exposure incident must be offered the full Hepatitis B immunization series no later than 24 hours after an incident. In Lihue, Kauai, this immunization series can be obtained by calling the Wilcox Memorial Hospital or going directly to the hospital at 3420 Kuhio Highway.

Exposure Incident Evaluation:

All first aid incidents involving exposures must be reported to the Corporate SHE Director before the end of the work shift in which the incident occurs. A First Aid Incident Report (Appendix 2) must be completed describing the circumstances of the accident and response in addition to the Supervisor's Report of Injury or Illness (Appendix 2). Following

a report of an exposure incident, AMEC shall provide to the exposed employee monitoring for HIV or HBV antibodies and medical counseling in cases of positive tests for HIV or HBV.

Waste Disposal:

Should biohazardous waste be generated as a result of a field-related injury, the "contaminated" waste and area will be cleaned to the extent possible with items provided in the packet, and arrangements for the pickup and final disposal of the waste will be made by calling the FM.

HBV Vaccination Declination:

For whatever reason (religious, personal, or otherwise), employees may decline or refuse the HBV vaccination by contacting the Corporate SHE Director. In instances where the vaccination is required, the employee will be required to sign a Hepatitis B (HBV) Vaccination Declination waiver (Appendix 2) indicating he/she has chosen at that time to refuse the vaccination, but may elect to receive it in the future at no expense to him/her.

9.4 ACCIDENT REPORTING AND RECORD KEEPING

The SHSC will contact the Corporate SHE Director and conduct an investigation jointly with the PM or FM. The FM or PM will complete the Supervisor's Report of Injury or Illness and the First Aid Incident Report (Appendix 2). These completed reports must be transmitted to the Corporate SHE Director within 24 hours of an occurrence; a fax is acceptable. The Corporate SHE Director will submit the appropriate reports to the AMEC Human Resources department in Kirkland, WA (for Workers' Compensation), and OSHA (as applicable).

The foreman or field supervisor of subcontracting crews will investigate and complete an injury/illness report (similar in content to the AMEC report) in accordance with their internal company policy. This report must be transmitted to the AMEC Corporate SHE Director within 24 hours.

In case of environmental incidents, property damage, power disruption, or mandated work "shutdowns," an Incident Report (Appendix 2) will be prepared by the FM or PM. Any damage, loss, or theft of AMEC property (items/tools/equipment) will be reported to the PM or FM.

Any release of information in these reports to unauthorized persons or agencies is prohibited unless it is first approved by the client. Certain agencies or persons, such as OSHA or OSHA inspectors, can request this information and its release will be permitted. Review the Emergency Call List for additional contact names and phone numbers.

9.5 EMERGENCY REFERENCE LIST

(Keep posted in vehicles and near communication system.)

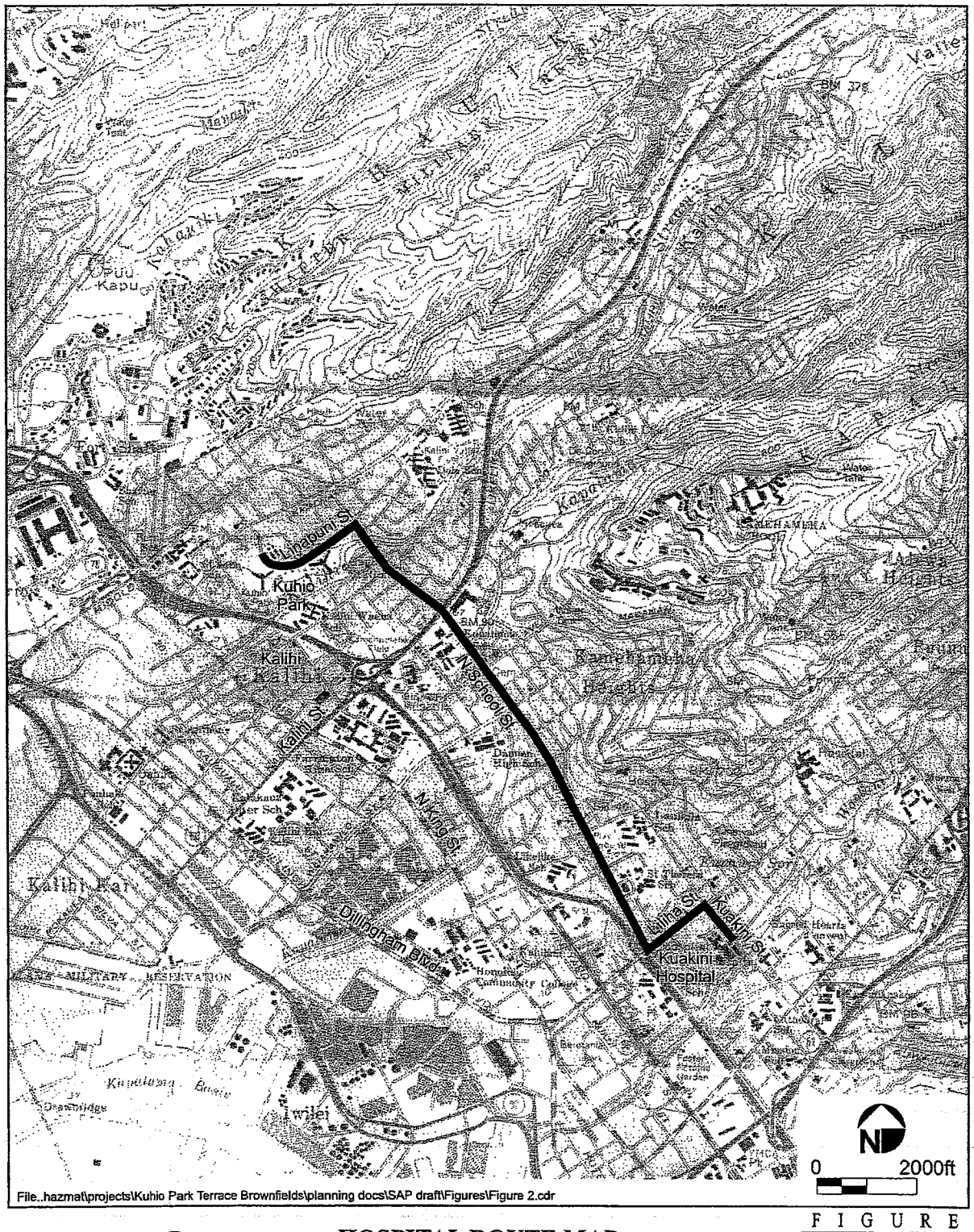
RESPONDING EMERGENCY AGENCIES

SERVICE	NAME	TELEPHONE NUMBER
Ambulance		911
Fire Department		911
Police Department		911
Poison Control Center	Oahu	(800) 632-3585
Civil Defense	Oahu State	(808) 523-4121 (808) 733-4300

AMEC CALL LIST

TITLE	NAME	TELEPHONE NUMBER
Corporate Safety, Health, and Environment Director	Vladimir Ivensky, CIH	(610) 877-6144
AMEC Project Manager	Liza Liew	(808) 545-2462 ext. 132
SHSC	Steffany Toma	(808) 545-2462 ext. 138
DBEDT Project Manager	Gail Suzuki-Jones	808-587-3802
DOH Project Manager	Melody Calisay	808-586-7576
EPA Quality Assurance Manager	Gail Jones	415-744-1498
OSHA	State of Hawaii OSHA	(808) 586-9110
Workers' Compensation	Joelle Lovestedt, HR, Kirkland, WA	(425) 820-4669 ext. 3166

* In the event of an occupational accident or incident, please indicate to the medical facility that this is a Workers' Compensation case; that your employer is AMEC; and that the insurance administrator is AIG Claims. Subcontractors will provide internal Workers' Comp. policy information; this should be provided to the SHSC at the prework meeting.



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HOSPITAL ROUTE MAP
Kuhio Park Terrace Site
Honolulu, Hawaii

FIGURE

2

10.0 HEALTH AND SAFETY PLAN ACCEPTANCE

I have had the opportunity to read and ask questions about this HSP. My signature certifies that I understand the procedures, equipment, and restrictions of this plan and agree to abide by them.

SIGNATURE*	PRINTED NAME	COMPANY	DATE

SIGNATURE*	PRINTED NAME	COMPANY	DATE

* This acceptance form is required for all routine site staff and subcontracting personnel. Visitors and nonroutine subcontractors are required to receive and sign the appropriate Health and Safety Orientation form located in Appendix 2.

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APPENDIX 1

MSDSs AND SELECTED CHEMICAL DATA SHEETS

NO MSDSs OR CHEMICAL DATA SHEETS ARE REQUIRED FOR THIS PROJECT

APPENDIX 2

PROJECT FORMS

Employee/Visitor Daily Roster*

Project No.: _____ Site Name: _____

Date: _____ Project Manager: _____

Date	Name	Company	Time Onsite	Time Offsite

* This roster is required for emergency response planning. All personnel arriving to and from the site must sign this roster. This log does not replace the on-site orientation by the FM or SHSC.

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SITE VISITOR HEALTH AND SAFETY ORIENTATION FORM

SITE _____ DATE _____

SITE HEALTH AND SAFETY COORDINATOR _____

SITE DESCRIPTION _____

_____

_____

_____

_____

_____

POSSIBLE SITE CONTAMINANTS AND HAZARDS _____

_____

_____

_____

_____

The information summarized below is important for you to read and fully understand. This information has been extracted from the site-specific Health and Safety Plan, and has been compiled to help ensure your health and safety on-site. If you have any questions regarding the information presented below, please ask your escort for clarification.

HEALTH, SAFETY, AND SECURITY INFORMATION

1. You must sign in and out of the Visitor Log Book maintained at the site. This assists in identifying all the visitors at the site in the event of an emergency.

2. If your business takes you beyond the designated VISITOR AREAS, you must be escorted. If you are observed unescorted in an unauthorized area, you will be asked to leave immediately.

3. Areas marked with yellow-and-black tape stating "CAUTION - DO NOT ENTER" demarcate where the Exclusion (contaminated) areas begin. You are not allowed to enter these areas.

4. Access to the contaminated area is strictly forbidden to all visitors unless they have approval of the client and can produce adequate written proof of acceptable training and medical certification prior to arrival on-site.

5. Hard hats and visitor safety glasses must be worn at all times on-site. Your escort will provide you with this safety equipment.

6. Please read and follow all safety signs on-site. The signs are there to alert you to possible physical and chemical hazards.

7. Eating and smoking is not allowed on-site. You may eat or smoke in designated clean areas or in your vehicle.

8. Please be cautious around heavy or moving equipment and vehicles.

9. Report any accident or injury to your escort.

10. No one under the age of 18 is permitted on-site without prior approval of the client.

11. No domestic animals are permitted on-site.

12. Please do not disrupt site activities or contribute to any unnecessary delays.

EMERGENCY NOTIFICATION

1. In the event of a site emergency, please walk immediately to the designated meeting area for the site. You will receive further instructions at this location. Please stay in this meeting area until the all-clear signal is given from the Site Health and Safety Coordinator or off-site emergency support personnel.

2. Please cooperate fully with those in authority in the event of an emergency.

ACKNOWLEDGEMENT OF INFORMATION

I have read and understand the above information provided by AEE, have had an opportunity to direct questions of a health and safety nature, and have received adequate answers or explanations from my escort or other site staff member. My signature also indicates that my employer assumes the risk of any injury or property damage that may occur to me or by me.

Visitor Signature	**Print Name**	**Affiliation**	**Date**

amec

SUBCONTRACTOR HEALTH AND SAFETY ORIENTATION FORM

SITE _____ DATE _____

SITE HEALTH AND SAFETY COORDINATOR _____

SITE DESCRIPTION _____

_____

_____

_____

_____

_____

POSSIBLE SITE CONTAMINANTS AND HAZARDS _____

_____

_____

_____

_____

The information summarized below is important for you to read and fully understand. This information has been extracted from the site-specific Health and Safety Plan, and has been compiled to help ensure your health and safety on-site. If you have any questions regarding the information presented below, please ask your escort for clarification.

HEALTH, SAFETY, AND SECURITY INFORMATION

1. All subcontracting personnel must acknowledge their presence on-site by checking in with the Site Health and Safety Coordinator. This assists in identifying all the personnel at the site in the event of an emergency.

2. All subcontracting personnel will be restricted to their "contracted" area(s). Do not enter any of the contaminated areas (marked with yellow-and-black caution tape) unless you have been authorized by site management and are wearing the proper protective equipment.

3. Hard hats, safety glasses, and safety boots are REQUIRED to be worn while you are working on-site.

4. Please read and heed all safety signs on-site. These signs are there to alert you to possible physical and chemical hazards.

5. Eating and smoking is not allowed on-site. You may eat or smoke in designated clean areas or in your vehicle.

6. Shirts are required at all times; long-sleeved shirts are preferred.

7. Before beginning any HOT WORK (welding, burning, and grinding) you must notify the Site Health and Safety Coordinator. The work area must be checked for flammables and combustibles, and a proper fire extinguisher must be close by before beginning the hot work.

8. Observe the proper lockout/tagout procedure before working on electrical and/or rotating equipment.

9. Normal subcontractor shift hours coincide with the regular AEE work schedule.

10. Report any accident or injury (even if minor to you) to the Site Health and Safety Coordinator.

11. No one under the age of 18 is permitted on-site without prior approval of the client.

12. No domestic animals are permitted on-site.

13. Complete cooperation with the Health and Safety Plan must be maintained. Any violation may result in expulsion from the site.

14. In the event of an on-site emergency, please walk immediately to the designated meeting area for the site. You will receive further instructions from this location. Please stay in the meeting area until the all-clear signal is given from the Site Health and Safety Coordinator or off-site emergency support personnel.

15. Please cooperate fully with those in authority in the event of an emergency.

ACKNOWLEDGEMENT OF INFORMATION

I have read and understand the above information provided by AEE and have had an opportunity to direct questions of a health and safety nature, and have received adequate answer or explanations from my escort or other site staff member.

Subcontractor Signature	**Print Name**	**Affiliation**	**Date**

AMEC Earth & Environmental, Inc.
Tailgate Safety Meeting Report

Check One:

❑ Initial Kickoff Safety Meeting ❑ Regular/Daily Tailgate Safety Meeting ❑ Unscheduled Tailgate Safety Meeting

Date: _____ Site: _____

Field Manager: _____ *(print)* Site Health and Safety Coordinator: _____ *(print)*

Order of Business

Topics Discussed (check all that apply):

❑ Site History/Site Layout
❑ Scope of Work
❑ Personnel Responsibilities
❑ Medical Surveillance Requirements
❑ Training Requirements
❑ Safe Work Practices
❑ Logs, Reports, Recordkeeping
❑ Sanitation and Illumination
❑ Air Surveillance Type and Frequency
❑ Monitoring Instruments and Personal Monitoring
❑ Action Levels
❑ Accident Reporting Procedures
❑ Site Control (visitor access, buddy system, work zones, security, communications)
❑ Discussion of previous "near misses" including work crew suggestions to correct work practices to avoid similar occurrences
❑ Engineering Controls
❑ PPE Required/PPE Used
❑ Define PPE Levels, Donning, Doffing Procedures
❑ Physical Hazards and Controls (e.g., overhead utility lines)
❑ Decontamination Procedures for Personnel and Equipment
❑ General Emergency Procedures (e.g., locations of air horns and what 1 or 2 blasts indicate)
❑ Site/Regional Emergency Procedures (e.g., earthquake response, typhoon response, etc.)
❑ Medical Emergency Response Procedures (e.g., exposure control precautions, location of first aid kit, etc.)
❑ Hazardous Materials Spill Procedures
❑ Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)
❑ Injury/Illness Reporting Procedures
❑ Route to Hospital and Medical Care Provider Visit Guidelines
❑ Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazards and effects)

Safety suggestions by site workers: _____

_____

_____

Action taken on previous suggestions: _____

_____

_____

Injuries/accidents/personnel changes since previous meeting: _____

_____

_____

AMEC Earth & Environmental, Inc.
Tailgate Safety Meeting Report *(continued)*

Observations of unsafe work practices/conditions that have developed since previous meeting: _____

_____

_____

Location of (or changes in the locations of) evacuation routes/safe refuge areas: _____

_____

_____

Additional comments: _____

_____

_____

Attendee signatures below indicate acknowledgment of the information and willingness to abide by the procedures discussed during this safety meeting.

Name (print)	Company	Signature

Meeting conducted by: _____ Title: _____
(print)

Signature: _____ Time: _____

Instrument Calibration Log

JOB NUMBER: _____ PROJECT: _____ LOCATION: _____

DATE/TIME	INSTRUMENT	SERIAL NUMBER	SPAN GAS SUBSTANCE	SPAN CONC.	INSTRUMENT READING AT CALIBRATION	INSTRUMENT CALIBRATION READING POST SAMPLING	COMMENTS

Site Air Surveillance Record

SITE INFORMATION		
Job Number:	**Date:**	**Site Location:**
Field Manager:	**Site Health and Safety Coordinator:**	

SITE CONDITIONS		
Temperature:	**Relative Humidity:**	**Wind Speed and Direction:**

Sample No.	Time	Sample Description	Location	Instrument	Reading	Comments

Workplace Exposure Sampling Record

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Name _____ Project No. _____

Social Security Number _____ Project Name _____

Employer/Officer _____ Project Dates _____

Job Function _____ Project Location _____

SAMPLING METHOD	SAMPLE TYPE	WORK ZONE
❑ Adsorber _____	❑ Area	❑ Contamination Reduction
❑ Detector Tube _____	❑ Background	❑ Exclusion
❑ Dosimeter Badge _____	❑ Biological	❑ Support
❑ Filter _____	❑ Personal	❑ Other _____
❑ Impinger _____		_____
❑ Meter _____		
❑ Other _____		

SAMPLE COLLECTION

Sample No. _____ Sample Duration _____ (min.)

Instrument Make/Model _____ Sample Rate _____ (mL/min.)

Calibration Date _____ Sample Volume _____ (L)

Sample Date _____

Collected By _____

Analyzed By _____

(Use reverse side for calculation and sketches as necessary.)

ATMOSPHERIC CONDITIONS

Humidity (%) ❑ Low 0-30 ❑ Med 30-70 ❑ High 70-100

Wind (mph) ❑ Light 0-5 ❑ Moderate 5-20 ❑ High >20

Temperature _____ °F Direction _____

ANALYTICAL RESULTS

Contaminant	OSHA PEL (TWA)	Concentration (Total)	Concentration (TWA)	Analytical Method	Detection Limit (Method)

PPE WORN (✓ = Yes)

❑ Half-Face Purifying Respirator
❑ Full-Face Purifying Respirator
❑ Air-Supplied Respirator
❑ Disposable Respirator
❑ Chemical Cartridge
❑ HEPA Cartridge

❑ Disposable Coverall
❑ Chemical Gloves
❑ Chemical Boots
❑ Slicker
❑ Unknown

❑ Safety Glasses
❑ Goggles
❑ Hearing Protection
❑ Other _____

OTHER REPRESENTATIVE PERSONNEL	GENERAL COMMENTS
_____ _____	_____
_____ _____	_____
_____ _____	_____

Supervisor's Report of Injury or Illness

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Note: To prevent accidents, it is necessary to know how and why they occur. Please complete both sides of this report. State facts as accurately as possible. Accurate reporting of all facts will help in the preparation of the "Employer's Report." Submit your complete report within 24 hours to Human Resources, your SHE Coordinator, and the Corporate SHE Director.

Name of injured employee		Department in which regularly employed
Injury date	Time of injury ❑ AM ❑ PM	Date and time employer was notified of injury
Did accident occur on employer's premises? ❑ YES ❑ NO	Where? (specify dept., job site, etc.)	Name of witness
What was employee doing when injured? (walking, lifting, operating machines, etc.) Be specific.		
Please describe fully the events that resulted in injury or occupational disease. Tell what happened and how it happened. (Do not describe nature of injury)		
What machine, tool, substance, or object was most closely connected with the injury? (e.g., machine the employee struck against or was struck by; the chemical in use; the object the employee was lifting, pulling, etc.)		
Nature of injury and part of body affected.		

Causes of Accident: Check All That Apply

Unsafe Building or Working Conditions

- ❑ Layout of Operations
- ❑ Layout of Machinery
- ❑ Unsafe Processes
- ❑ Improper Ventilation
- ❑ Improper Sanitation/Hygiene
- ❑ Improper Light
- ❑ Excessive Noise
- ❑ Floors or Platforms
- ❑ Miscellaneous

Housekeeping

- ❑ Improperly Piled or Stored Material
- ❑ Congestion

Physical Hazards or Equipment

- ❑ Ineffectively Guarded
- ❑ Unguarded
- ❑ Guard Removed
- ❑ Defective Tools
- ❑ Defective Machines
- ❑ Defective Materials

Discipline

- ❑ Not Following Safety Rules
- ❑ Horseplay

Apparel or Personal Protective Equipment

- ❑ Protective Equipment Not Used
- ❑ Unsuitable Protective Equipment
- ❑ Unsuitable Clothing or Footwear

Instructions and Training

- ❑ None
- ❑ Incomplete
- ❑ Erroneous
- ❑ Not Following Instructions
- ❑ Operating Without Authority
- ❑ Working at Unsafe Speed
- ❑ Inexperience
- ❑ Untrained in Procedure
- ❑ Incorrect Use of Tool or Equipment
- ❑ Improper Judgement
- ❑ Improper Lifting
- ❑ Lifting Excessive Weight

What can be done to prevent such an accident from happening again?

Approximate date condition will be corrected?

Additional Information

NOTE: The information requested below is important for complete documentation of a reported occupational injury or illness.

ACCIDENT/INCIDENT INFORMATION		
To whom was the injury reported?	Injured worker's shift times START ____ AM ____ PM	END ____ AM ____ PM
Is the accident/incident questionable to the supervisor? ❑ YES ❑ NO	Were there any signs of the involvement of drugs or alcohol? ❑ YES ❑ NO ❑ Unknown	
Was the employee permanently disabled as a result of the accident/incident?	If accident resulted in a fatality, date of death. ❑ NA Date:	
Last date worked and time employee left work	First day missed?	Number of days employee is expected to miss, if applicable.
Has the employee returned to work? ❑ YES Date:	❑ NO Expected return date:	
ACCIDENT INVESTIGATION INFORMATION		
Was any safety equipment provided? If yes, was it used?		
Was a third party responsible for the accident/incident? If yes, list name, address, and phone number.		
MEDICAL CARE PROVIDER INFORMATION		
Was first aid administered on-site? ❑ YES ❑ NO If yes, describe.		
Name of clinic and/or doctor employee saw. Include address, city, state, zip code, and phone number.		
Name of hospital employee was taken to, if applicable. Include address, city, state, zip code, and phone number.		
Was the employee admitted to the hospital? ❑ YES ❑ NO If yes, on what date?		
Was the employee treated as an outpatient, receive emergency treatment, or ambulance service?		
Supervisor's Name (please print)	Supervisor's Signature	Date

First Aid Incident Report

Date of Report: _____ Report Completed by: _____

Date of Injury/Incident: _____

Description of the Injury/Incident: (time, location, event, description of injuries) _____

Name of Injured Person: _____ Employer: _____

Name of First Aid Provider(s): _____

Social Security Number: _____

Bloodborne Pathogen Exposure Incident Evaluation: _____

1. Was the First Aid Responder exposed to blood or other potenially infectious materials? _____

   ☐ Exposure Occurred (see question 2)

   ☐ No Exposure

2. Exposure occurred by contact with the following (check all that apply):

   ☐ Eye
   ☐ Mouth
   ☐ Other Mucous Membrane
   ☐ Broken Skin (cuts, abrasions)
   ☐ Needlestick
   ☐ Human Bite

Exposure Control Precautions Taken (check all that apply):

   ☐ None (contact SHE Coordinator or Corporate SHE Director)
   ☐ Glove
   ☐ Face Mask
   ☐ One-way CPR Valve
   ☐ Eye Protection
   ☐ Immediate Personal Hygiene
   ☐ Previous HBV Immunization
   ☐ Recommended for HBV Immunization
   ☐ Other _____

Please attach this completed form with the Supervisor's Report of Injury or Illness, and the Accident/First Aid Incident Summary Log, and forward to Human Resources, your SHE Coordinator, and the Corporate SHE Director.

Period Covered: _____

Location: _____

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ACCIDENT / FIRST AID INCIDENT SUMMARY LOG

Date/Time	Employee Name	AEE Location/ Project	General[1] Description	First Aid[2] Provided?	Medical Attention?	Comments	Universal Precautions Taken?
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							

[1] Attach completed Supervisor's Report of Injury or Illness

[2] Attach completed First Aid Incident Report

HEPATITIS B (HBV) VACCINATION DECLINATION

In accordance with 29 CFR 1910.1030, I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

_____ _____

Signature Date

_____

Printed Name

Distribution:

Corporate Health, Safety, and Environment Manager
Human Resources Manager

Incident Report

(Please Print Clearly)

Report Number: Report Date: Incident Date:

Project Title and Location:

Project Number:

Location of Incident:

Names of All Personnel Involved:

Describe the incident as it occurred (use additional sheets, if necessary).

Names of Witnesses	Relationship to the Incident	Where They Can Be Reached

Project Implications

What is the cost impact to the project (e.g., lost days, man-hours, equipment)?

What is the schedule impact to the project?

Does the incident impact the scope of the project in other ways? If so, how?

Distribution: Corporate SHE Director, PM or FM, and Office SHE Coordinator.

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Record of Change
Site-Specific Health and Safety Plan

GENERAL SITE INFORMATION

Site Name: _____ Date: _____

Project Number: _____

Site Health and Safety Coordinator: _____

Project Manager: _____ Field Manager: _____

DESCRIPTION OF AND JUSTIFICATION FOR CHANGE

SHSC Signature: _____ Date: _____

Authorization: _____ Title: _____ Date: _____

AMEC Earth & Environmental, Inc. (AEE) Biweekly Summary

(for projects that take place over a period of more than two weeks)

Date _____ Project No. _____ SHSC _____

SCOPE. Briefly describe the range of work tasks being performed during this period. _____

HSP COMPLIANCE. Indicate and describe any HSP-related compliance issues.

- ☐ Non-use or misuse of PPE in required areas.
- ☐ Violation of eating, smoking, or chewing in prohibited areas.
- ☐ Are there any recommended change orders to the HSP? _____
- ☐ Other _____

INJURY/INCIDENTS/ILLNESSES. Note any job-related first aid, injury, or illnesses during this period.

- ☐ Yes _____
- ☐ No
- ☐ Reports previously submitted

INSPECTIONS. Indicate any inspections conducted during this period of:

- ☐ General site conditions
- ☐ Emergency equipment (first aid kit, SCBAs, fire extinguishers, etc.)
- ☐ MSDSs on file for all chemicals and calibration gases brought/used on-site
- ☐ Accurate maintenance of site sign-in sheets and visitor logs
- ☐ Contractor(s) inspection/maintenance of respective on-site equipment
- ☐ Routine monitoring equipment maintenance (as applicable)
- ☐ Other _____

SITE CONDITIONS.

- ☐ Describe weather conditions (temperature, wind speed direction) _____
- ☐ Has weather played a role in site efforts? _____
- ☐ Is dust control adequate? _____
- ☐ Is the hearing conservation program adequate? _____
- ☐ Is the heat stress monitoring program adequate? _____
- ☐ Have you received any complaints? _____

SUPPLIES/EQUIPMENT. Are there any supplies, equipment and/or services that you have procured? _____

GENERAL COMMENTS (use reverse as necessary) _____

_____

SHSC Signature *Date*

Submit to the project manager and HSM and maintain in project files.

APPENDIX 4

JUSTIFICATION OF ACTION LEVELS

APPENDIX 4

JUSTIFICATION OF ACTION LEVELS

A. ESTABLISHMENT OF DUST MONITOR ACTION LEVEL FOR LEVEL C UPGRADE USING AN MIE MINIRAM PDM3

Contaminant Data *(Tailor and complete as much of the table below as possible. Refer to Table 2 for contaminants with low TLVs or those known to be present on the site at high concentrations.)*

Selected Contaminants	OSHA PEL	OSHA Action Level (1/2 PEL)	Max Concentration in Soils (mg/kg) (Assumed)
Arsenic	*0.5 mg/m^3*	*0.25 mg/m^3*	*1000*
Cadmium	*0.005 mg/m^3*	*0.0025 mg/m^3*	*1000*
Lead	*0.05 mg/m^3*	*0.025 mg/m^3*	*1000*
Mercury	*0.01 mg/m^3*	*0.005 mg/m^3*	*1000*

Calculation *(Insert ABOVE contaminants in Table below.)*

Formula: (maximum contaminant concentration)*(instrument action level [AL])*(conversion factor) = the derived contaminant concentration in air (as dust).

	Max Contam. Concentr. (mg/kg)		Instrument Action Level (mg/m3)		Conversion Factor (kg/mg)		Derived * Concentr. (mg/m3)
Arsenic	1000	*	4	*	1.0E-6	=	4.00E-03
Cadmium	1000	*	4	*	1.0E-6	=	4.00E-03
Lead	1000	*	4	*	1.0E-6	=	4.00E-03
Mercury	1000	*	4	*	1.0E-6	=	4.00E-03

*The derived concentration cannot exceed or approach the OSHA action level (1/2 PEL) for each contaminant. If it does, then reduce the instrument AL (usually between 1 and 5).

The Instrument Action Level for Level C upgrade due to potentially contaminated dust is set at 4 mg/m^3 (PM<10μ) above background measured in personnel breathing zone.

Assumptions and Selection Justification

1. OSHA Action Levels for Level C PPE upgrade are defined as 1/2 of the OSHA PEL.
2. Generated dust concentrations are 100% respirable/inhalable (< 10 microns).
3. Complete mixing efficiency of dust and contaminants in air is assumed.
4. Contaminants were selected because of their low PEL or high soil concentration on-site.
5. Contaminant concentrations were assumed because there are no previous analytical data for these sites.
6. Anticipated trade winds between 5 to 15 mph and discontinuous exposures would not produce an 8-hour TWA exposure that exceed the PELs.
7. Historical data for similar contaminants produced during similar tasks did not produce employee exposures exceeding the PEL.
8. Perimeter action levels are 1/3 work zone action levels based on a 24-hour exposure, no ability to upgrade, and lower health status generalizations.
9. Particle size range of MiniRAM personal dust monitor is 0.1 to 10 microns (μ).

Summary

The Instrument Action Level selected 4 mg/m^3 does not exceed the OSHA Action Level (1/2 PEL) for respirable dust or the selected contaminants and includes a safety factor for instrument response and concentration variability.